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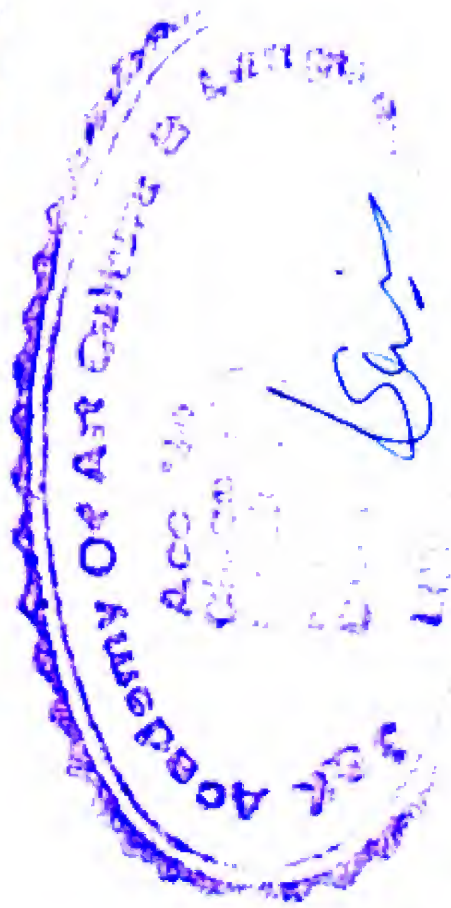
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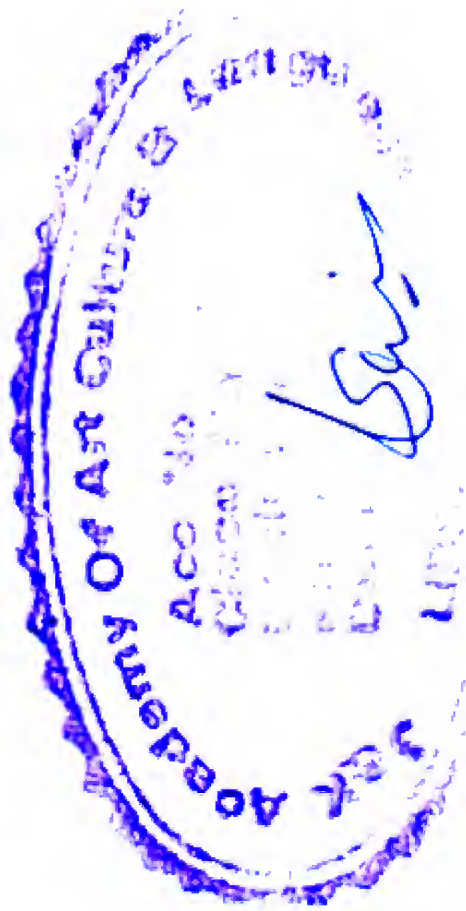
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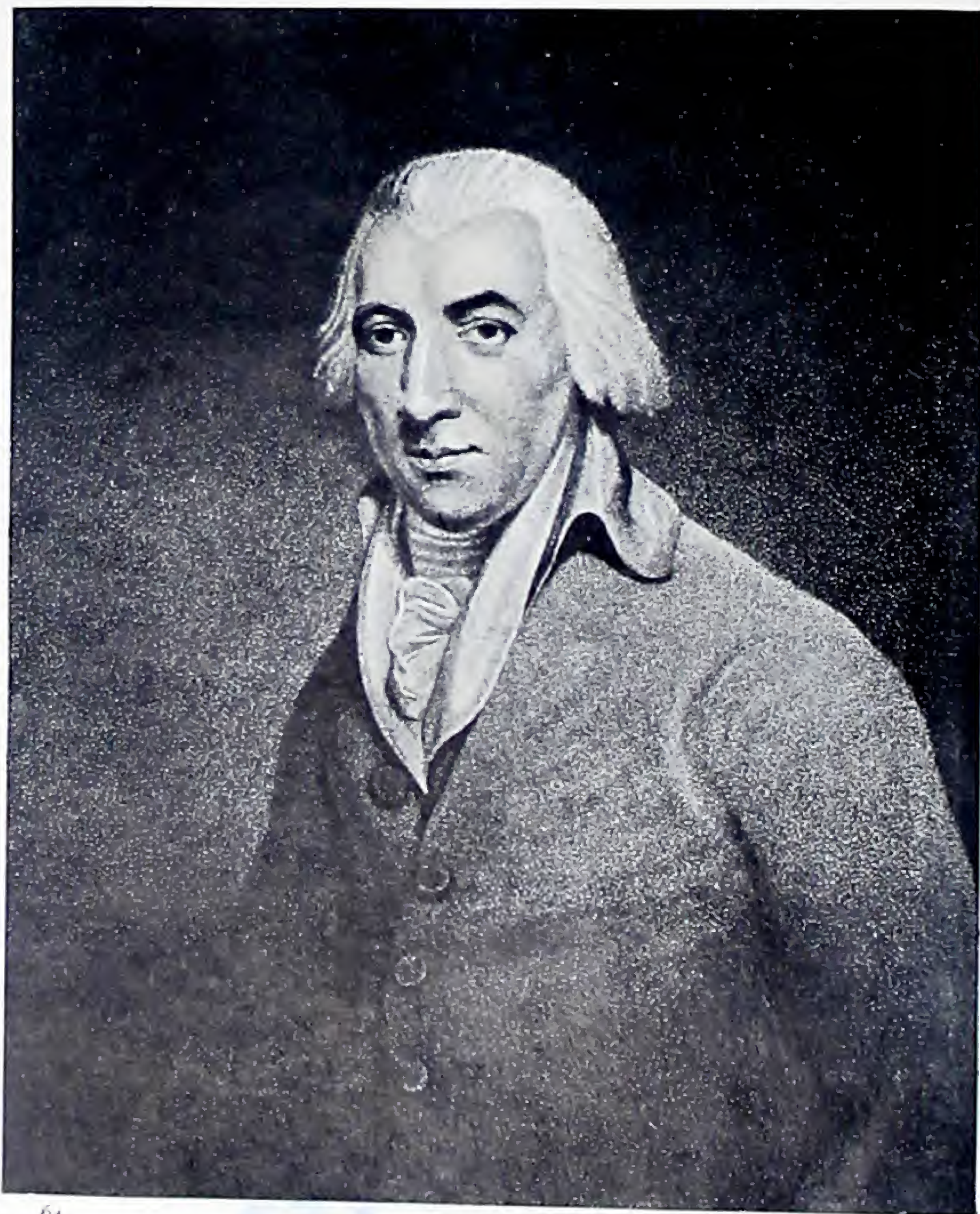
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ARTHUR YOUNG, F.R.S.
1741-1820

First Secretary to the Board of Agriculture
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LIVE STOCK OF THE FARM

BY MANY SPECIALISTS
UNDER THE EDITORSHIP OF
PROFESSOR C. BRYNER JONES

M.Sc., F.H.A.S.

Agricultural Commissioner for Wales under
the Board of Agriculture and Fisheries and
Chairman of the Welsh Agricultural Council

VOLUME V
PIGS AND POULTRY

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LIVE STOCK OF THE FARM

VOLUME V

CHAPTER I

BREEDS OF BRITISH PIGS

BY PROFESSOR JAMES LONG

It is a striking fact that the improved pigs of the world owe both their increased size and their quality to one or more of the English varieties. There are now no known varieties in any other country which can compete with our native breeds, and we may include those American pigs which practically owe their existence to them. It is curious that the production of the pure breeds known in these islands should have been confined to England. Ireland, a great pig-breeding country, has no breed of her own. In Scotland pigs are not popular, and no effort is made to increase them. Thus English breeds dominate the world, and nowhere is it possible to find varieties which are able to compare with the size of the Large White, the Large Black, or the Lincoln Curly-coated pig, or with the quality of the Berkshire, the Middle White, and the Tamworth.

Indirectly the character of the English pig is due to the bacon curer, although his work has been supplemented by the exhibition system. The Englishman is undoubtedly the greatest consumer of bacon in the world; but in spite of this, and of the fact that he breeds the choicest pigs for bacon production, he declines to extend his piggery and to cure his own meat, preferring to buy it and to pay for the privilege. The necessity for producing prime bacon and hams has induced curers to regulate the price they pay to breeders for pigs on the basis of their suitability. They require hams of medium size, with a fair proportion of lean meat and a moderate proportion of fat. They demand bacon of similar type—loins thick, with not more than $2\frac{1}{4}$ in. of fat; sides well streaked for breakfast rashers and plenty of them; and fore ends, where the

quality of the meat is poorest, which are small and not too fat. The meat, too, must be mild and the fat firm, oiliness being an objectionable characteristic. Breeders have found by experience that in order to produce good bacon pigs the stock they employ must be of a suitable type. The sows must be large, because they produce large pigs which are weaned early and soon fat; the neck must be fine and not too short, or the fore ends will be unsuitable; the head must be of medium length, rather too long than too short—a short head, like short ears, denoting diminution in the size of the young and excessive fatness in proportion to lean; abundance of fine hair, which is characteristic of quality combined with constitution; length and width of body and depth of the sides, denoting plenty of room for the vital organs, a greater quantity of loin, and streaky meat; full, well-formed hams; and an ample udder, which enables a sow to feed a strong litter. Such are the points of a pig which will breed porkers and baconers suitable to the buyers' requirements, and it is largely because these demands have been significantly framed and are the basis of payment that English pigs are what they are. Although the majority of our pure varieties have been long established, their type at this moment is the result of modern breeding to suit the buyer on the one hand and the exhibition judge on the other. Thus it is that the Danish farmer, as a producer of bacon for British consumption, has done his work with English pigs.

The commercial pig of to-day, wherever bred, is a descendant of the wild hog, which at one time was common in Britain. About the middle of the eighteenth century pigs were kept in large herds in the north of England and Scotland where land was unenclosed, and there is reason to believe that they were of a semi-wild character—a half-way house between the wild hog and the domesticated pig of fifty years later. At that time, however, the white pigs of Cheshire, and the red and black pigs of some other counties, were of a superior type—hand-fed in the sty and managed under better conditions. It is a curious fact that immediately pigs are left to themselves and allowed to roam and feed at will they commence to decline, and gradually approximate to the type and condition of their unimproved ancestors. Breeding by selection has not only improved the form of the pig and the quality and character of its meat, but it has modified its habits and its temper. Thus the well-bred pig is a very different animal to handle from the mongrel. Contact with man, confinement, the habitual provision of food and of a comfortable home, have all played their part in this change, but the food itself has exercised great influence

in this modification. Formerly the pig was regarded as the recipient of the offal of the house and often of the slaughterhouse, than which nothing could be worse. Gervase Markham, for example, tells us that "the pig is the husbandman's best scavenger and the housewife's most wholesome sink". Now, however, the pig is fed, as we have often remarked, as well as, sometimes better than, the poorest of the working classes, obtaining plenty of sweet milk, sound meal, and potatoes—a combination which, were they able to obtain it, would abolish the poorhouse and the growing system of feeding children at our public schools.

Our English breeds of pigs have been established within the past seventy, we may almost say within the last sixty, years. They owe their improved character to the Chinese and the Neapolitan breeds, the former of which is known to have been used in this country as early as 1770. Although no serious effort was made till early in the last century to breed to type, great improvement was effected by crossing. The flat-sided, lanky, narrow, coarse-haired and coarse-fleshed pigs of the day were changed by these crosses into something approximating to the type which was exhibited fifty years later at the Royal and other shows. The imported pigs were in form quite the reverse of the pigs of the country—compact, with little hair, short-faced, prick-eared, short-legged, fertile, fattening rapidly, and producing fine meat; the crosses were ideal, and there is little doubt that while improving the quality of the flesh and the aptitude to fatten easily, crossing was responsible for the form of the head which is so conspicuous in the Small and Middle White breeds. While the Neapolitan—which was also largely used in the improvement of British pigs—was less vigorous in constitution than the Chinese, and less prolific, it also imported fattening properties, improved the flesh and the form of the carcass, and especially was this the case with the black pigs of the country. Although it carried its small ears erect and possessed a short face and little hair, it was short in the leg and wider in proportion to its length.

The improvement of the pig owes something to the societies which have been formed for its encouragement, but the varieties as they exist were almost of necessity formed before the organizations by which they are represented. The work has been done by individuals like Joseph Tuley the Yorkshire weaver, W. B. Wainman, Fisher Hobbs, and later by Peter Eden and Captain Heaton, with both of whom the writer was well acquainted. The work of the formation of type commenced by the first three breeders named was completed by the last two, who, up to the day of the death

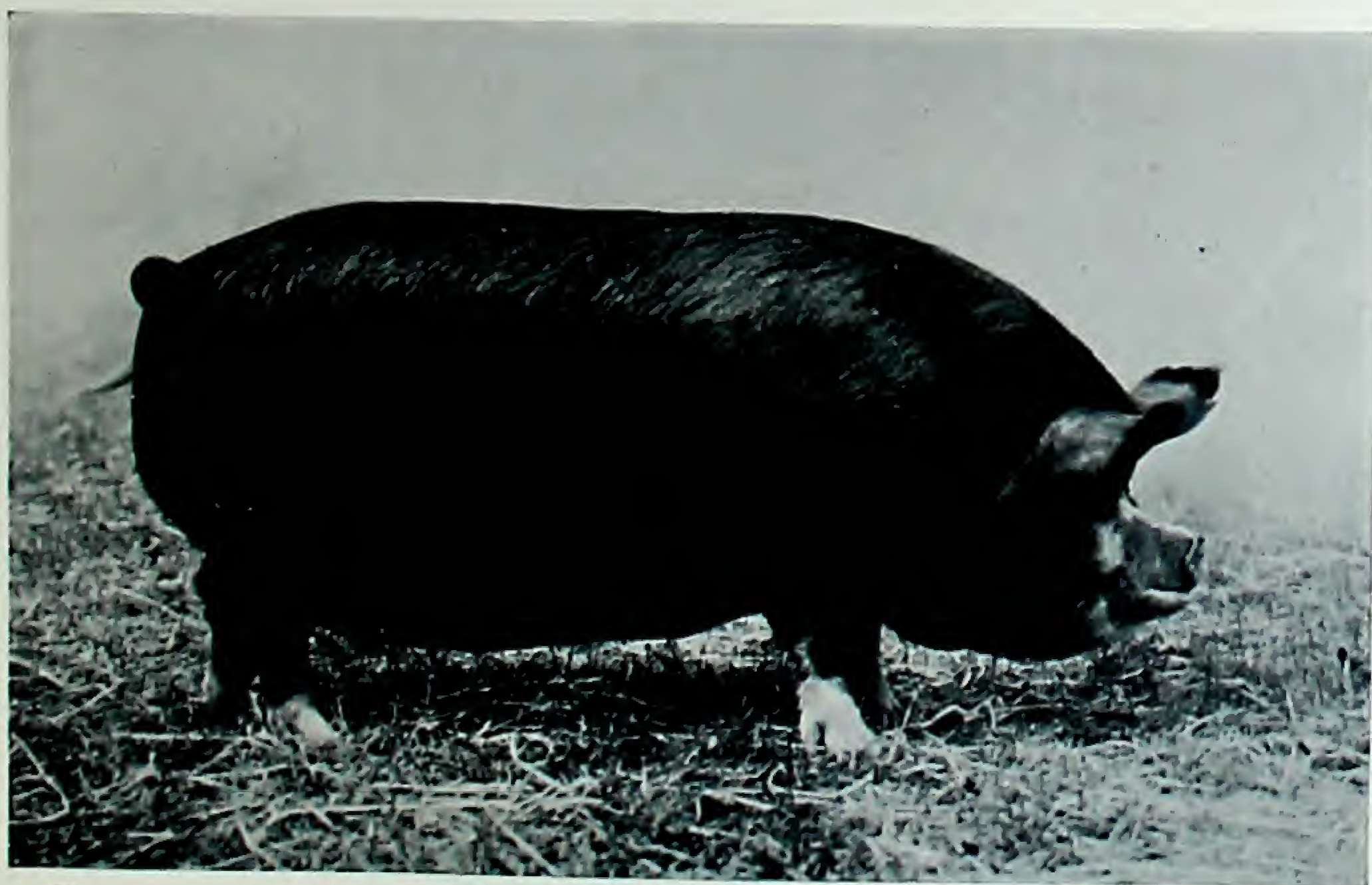
of the latter, had produced the finest white pigs of the Large and Middle breeds ever seen in the showyard. Since that date the Large Black and the Lincolnshire pig have appeared, and these have been bred upon similar lines, and if we may judge by the weight attained by young specimens at Smithfield, they have excelled the Large Whites. The value of the pure breeds may be gauged from the fact that before the modern breeds were fixed in type, the pork and bacon produced in the country was not only coarse and excessively fat, but it was the produce of pigs of from twelve to eighteen months, sometimes two years old; whereas the meat of to-day is not only finer in quality, providing a normal proportion of lean, but the produce of young pigs of five to seven months old, and as a natural sequence, more tender and sweeter. For this reason in particular the cost of production is smaller, while the price realized is perhaps greater than ever before. Thus purity of breed has enabled the pig-keeper, and especially the labouring man, to keep pigs with profit to himself; whereas in earlier days he frequently lost money, the cost of the meal exceeding the value of the fattened pig. Excessive fatness, however, is still a frequent fault, and we have measured 3 in. of fat on the back of dead pigs in the carcass competition at Smithfield, where the fattest pigs are sometimes the produce of a cross.

When the pig was first improved, those with white skins were usually spotted with black, and some of the best animals exhibited at the Birmingham Fat Stock Show were able to walk to market, resembling their remote ancestors rather than those which had been used in their improvement. This fact was supplied to the writer some thirty years ago by the treasurer, Mr. Lowe, who had been closely connected with the show for nearly fifty years. In the early years of the last century each part of England and sometimes each county possessed pigs of a particular type, but the prevailing faults were common to them all—flat sides, narrow loins, long heads and legs, flap ears, and coarse hair and flesh. A few breeders had employed imported stock and effected a change. That change gradually extended until a new type was evolved, but the poor man's pig was to remain unimproved for a long period of time. With this improvement pigs were classified at the great agricultural shows, although not as they are classified to-day. Size was the first determining consideration, and, curiously, description in accordance with size still differentiate the Large, Middle, and Small White or York pigs. Still later, colour and size in combination were employed in arranging classification, until the Berkshire was awarded a class by itself. In this way the White pigs,



BERKSHIRE BOAR—"GOLDICOTE TOBEE"

Photo. Babbage



BERKSHIRE SOW—"VENUS"

Photo. Babbage

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like the Berkshires, were provided with classes, the Tamworths being added many years later, mainly through the efforts of Mr. G. Mander Allender, then an enthusiastic breeder of this variety. The earlier black pigs exhibited were of small and medium size, hailing chiefly from Suffolk, Essex, and Dorset; but, like the Small Whites, which were bred rather to an exhibition standard than for utility, these pigs were abandoned, and they have not been seen at the leading shows for many years. As farmers acquired greater knowledge of pigs, of the requirements of foreign buyers and of bacon curers at home, they discarded the smaller varieties and commenced to improve the large type of black and white pigs, with the result that in a very few years the Large Black and the Lincolnshire Curly-coated pigs have not only made their appearance, but achieved a distinguished position among the best in the world.

An example, showing how pigs in country districts were improved, may be quoted, the facts being within our actual knowledge. In the district in question some of the best sows—for they were regarded as good—were of the old-fashioned, long-bodied, flat-sided type, with long legs and flap ears. Their chief merit was their prolificacy, producing as they did abnormally-large litters. One of the chief residents attended a sale of exhibition pigs on the retirement of the breeder from the show ring, and was induced to buy several specimens which he recognized were radically different to the pigs in the district in which he lived. He bred them for years and sold specimens to his neighbours, who, breeding from them and selling their progeny, caused a revolution in the type of pigs bred in that part of the county, and indeed much farther afield, for they were sent to all parts of the country. Thus it is that county types have given place to pigs of pure breeds, and there is no longer the supposition that the Yorkshire pig thrives only in the county of York or the Berkshire in Berks. Pigs of each variety will thrive anywhere, and may be sent to the ends of the earth if they are healthy and have good constitutions.

Nor is there any reason to suppose that the black pigs are superior to the whites, or vice versa, although butchers, like many farmers, have their ideas, and we have known the former decline to buy pigs of a white variety. There was, however, often reason in these objections. Both the blacks and the whites of the smaller type were unprofitable, a fact which was known to the butcher, and in consequence he hesitated to buy pigs of a type which was strange to him. The whites were refused in the black-pig districts and the black pigs where the whites were most bred. The Suffolk pigs as once bred by Mr. Sexton and the Small Whites of Lord

Radnor were both too slow in growth and too fat, and were replaced by the Large Whites and Berkshires of an economical strain, for this variety was sometimes equally undesirable.

Until the eighteenth century, when the first successful efforts were made in the improvement of cattle, practically no attention was devoted to pigs, if we may be guided by the remarks of the old English writers on stock. There was no system, and consequently no pedigree herds. They possessed no approach to symmetry; there was no recognized system of feeding, apart from the fact that whole herds were allowed to graze and to consume acorns and beech nuts at will; in fact, they followed the habits of the wild pigs from which they had originated, modified only by the control of their owners. Although so short a space of time separates the wild boar from the model pig of to-day, there is great reason to believe that the Romans had pigs on lines similar to those adopted by modern breeders. The weights which were attained were apparently equal to those reached by the best pigs of the present century, and this points to the supposition that the pigs were bred with some skill, the unimproved, like the wild pig, being fattened with difficulty, and never to the same extent that is possible with modern breeds.

Berkshire Pigs

We are able to describe the Berkshire not only as it is, but as it has been for a period of sixty years, having in earlier days obtained first-hand facts from some of the best breeders of the time who kept the variety so long ago. We have long since arrived at the conclusion that the modern Berkshire is smaller than it used to be, and that pigs of some strains are too fat, a fact which breeders themselves have attributed to crosses with the Suffolk and some of the black pigs of Dorset, which are believed to have been the result of using Neapolitan blood nearly a century ago.

The Berkshire pig, although chiefly bred in the south and south-west of England, is now to be found in all counties, owing largely to its meritorious properties and its generally attractive appearance. It is, too, much more largely bred in America than with us; but for some unaccountable reason it has never attracted the Continental breeder. We have seen the Large White—although very poor specimens—in various European countries, the Germans and the Danes in particular having used it largely, but never a

specimen of an English black variety. The immediate progenitors of the Berkshire were black and white, although the disposition of the colours has not been defined, and they were sometimes spotted with red. They were, however, a larger, leaner pig than their purer descendants, and coarser in type. It has been supposed that the purer Berkshire was the result of crossing these pigs with the Neapolitan, but we have been unable to verify this belief. It is quite certain, however, that the pig, before its canonization as a breed, reached great weights, while some specimens have been shown to have exceeded 6 ft. in length. The earlier pigs were, too, better adapted for bacon than for pork, the sides or flitches being long and deep and well streaked with lean, whereas among the Berkshires now exhibited at winter fat-stock shows the fat is excessive in quantity. In 1902 the heaviest pair of Berkshires shown at Smithfield under nine months old scaled 6 cwt. 3 qr. 20 lb. at 8 months 4 weeks, or 388 lb. each. Assuming these pigs to provide 85 per cent of carcass, the sides would reach 166 lb. each, or when cured and smoked about 150 lb.—too large and certainly much too fat for the trade. Pigs of this weight, therefore, are undesirable, although the breeder is encouraged to produce them in order to win prizes. In the same year one of the oldest breeders of the variety, the late Richard Fowler, of Aylesbury, exhibited the heaviest single Berkshire in the show, this pig scaling 465 lb. at the age of 11 months 3 weeks 2 days, whereas a pen of two, shown by the same gentleman, reached an average of 489 lb. each at a similar age. Since that day classes for porkers and pairs of pigs not exceeding 100 lb. live weight have been introduced, with more practical results. The old classes, however, remain, and pairs of pigs weighing between 8 and 9 cwt. at 11 months, and between 6 and 7 cwt. at 8 to 9 months old, are as common as before. As pigs are now sold at a very early age, there is no advantage, present or prospective, in feeding Berkshires to great weights; on the contrary, certain loss will follow. From the point of view of early maturity, pigs of the variety are not so useful as those of the larger breeds. Had the Berkshire been a large breed, there would have been no *raison d'être* for the introduction of the Large Black; nevertheless, it is a strong testimony to the value of the variety that it maintains its ground in the presence of three large breeds, all of which are undoubtedly more economical.

Apart from want of size, the Berkshire wants length and depth. It is practically bred to an exhibition type, and although it possesses properties of so useful a character that it would be unkind to compare it with the defunct Small Black or the moribund Small

White, yet there is a danger of its going the same way. It possesses a great hold on those districts where it has been bred so long, but the demand for size is growing, and breeders must respond. The colour of the breed has often been discussed. In judging we have noticed the remarkable difference between the plum-shaded and the dead-black of the skin to the disadvantage of the latter, which we have known to be emphasized by the use of lamp-black and oil. The plum-shaded blacks have finer skins and hair, and they are less coarse, but sometimes too fat. This is the tendency at a time when the curer is demanding leaner meat.

That the modern Berkshire has been improved by crossing with still fatter strains of black pigs than its own, and during the last forty years, there is abundant evidence. In the face of the Herd Book, however, this is now impossible. Had pigs used for crossing been drawn from a large breed, the results would have been better than resort to the Suffolk, which was never an economical pig in its palmiest days, a fact of which we had practical proof. There is no better way of improving a variety of pigs than by suitable classification at the Royal; but under present conditions judges will continue to award prizes to the existing type. At the great summer meeting the pigs shown are assumed to be for stock purposes; but they are generally fat, instead of being shown in breeding condition. Thus the young, like the older Berkshires, are forced, in order to produce size and a handsome appearance, which in the eyes of the judges means fat.

A really good Berkshire, i.e. a pig of good size, length, and depth, is an excellent bacon pig, but the typical Berkshire of the day, such as are shown at all cattle shows, is better adapted to the production of pork. It is not so rapid a grower as pigs of the large breeds; it matures later, and it carries a larger proportion of fat to lean. Perhaps for the latter reason it is well adapted for crossing with long-bodied, deep-sided, common country sows, which throw better pigs by such mating. The show type of Berkshire is too short and thick, and is poorer in hair, always an indication of a disposition to lay on too much fat, and it produces small litters. There is a good deal in the contention that the white points, which are purely fancy points, and have no significance of a practical character, stand in the way of the progress of the breed. No Berkshire breeder, however, will allow these points to be dispensed with. In selecting sires and dams the available animals are thus arbitrarily limited, while pigs which in times past would have materially assisted in improving the size, constitution, prolificacy, or quality of the breed have been rigidly excluded, because they

had not a white tip to the tail, a white mark on the face, or four white feet. Similarly, good pigs are excluded which are marked too freely with white; and so it is that the Berkshire has developed into a fancier's breed first of all, in spite of its acknowledged useful properties. Bred as some farmers produce it, the Berkshire is hardy, prolific, throwing two litters a year, and making excellent lean bacon; but in these cases there is not that impolitic habit of breeding so strictly to colour. The young pigs are bred and fed for the butcher, and their colour is not a very material consideration. It is true that butchers in the Berkshire districts prefer to buy well-bred pigs, and their estimate of their quality is largely governed by their appearance of purity. Berkshires when ready to kill will scale 80 to 90 per cent carcass weight, very fat pigs reaching the latter figure; but this is not especially meritorious, 80 per cent is good enough when it indicates, as it usually does, fairly-lean meat. Close breeding has also been unsatisfactory in the Berkshires; it has exerted a bad influence in affecting the size of the pig, in diminishing its fecundity, and impairing its constitution where it has been practised. Good strains, which have not suffered from errors in breeding, produce fine youngsters at four to five months old for sale as porkers and baconers at seven to eight months.

One of the faults of many Berkshires is sloping quarters. A good pig with a straight back, a wide loin, and well-placed hams, the tail being set on high, is well finished in the hind quarters; but there are too many pigs in which these points are wanting, the slope spoiling the hams and giving them an unfinished appearance. If a pig is well built, its hams will be large and meaty, its loins wide and its sides deep, with thickness underneath. Such are Berkshires of the best type. The face, however, should not be dished, although this point is one which an old breeder who kept Berkshires sixty years ago once told the writer he preferred. This gentleman, however, claimed that a good Berkshire pig was low, level, lusty, and long in the body, and that a sow should, when mature, produce from nine to twelve pigs at each litter, which is probably more than she averages at the present time. Such a pig should also, he claimed, reach a weight of 400 lb. in a year, the meat producing fine bacon. In those days a Berkshire sow was so precocious that she was often mated with the boar at the age of eight months, the object being to induce her to produce her first litter at the end of her first year. This plan, however, is not advisable in a breed which matures slowly, and to which it is desirable to give time to grow to full size. A Berkshire gilt will

grow a good deal after she has reached the age of a year, and it is therefore undesirable to require her to feed a litter at this time. It is well known that Berkshires cross well with the Red Tamworths, which are long-bodied pigs, the produce making some of the best baconers which can be produced, the quality of the meat being, as we believe, irreproachable.

With regard to the points of the Berkshire a few words must be said. Breeders in both England and America incline to shortness of head. While in this country the expression is qualified, as moderately short, with fairly large ears and dished face, in the United States the standard insists on a short face, well dished, and surmounted by small ears, which should be thin and almost erect. As we have seen already, a head of this type is indicative of a tendency to lay on too much fat to please the consumer, and to restrict size. As size is almost imperative in the modern pig we cannot but regard the standard as a bar to progress; and facts illustrate this belief, for in place of the defunct Suffolks and Small Whites we have the Large Black and the equally large Lincolnshire, both of which have made greater strides in public favour than any variety since the advent of the Large White. Again, there is nothing in the standard of excellence to indicate the size of the Berkshire. In dealing with a large breed the description alone is an indication, and therefore in judging those concerned of necessity insist on size. With the Berkshire, however, it is quite the other way, the modern pig makes no pretension to size, and there is no effort made to increase it, specimens which are somewhat smaller than a middle breed being acceptable without demur. If the Berkshire Society regarded size of greater importance, as they may one day be compelled to do, in order to meet the views of curers of bacon, they will assuredly include it in their standard. In this case breeders would respond accordingly, for there cannot be a doubt about their ability to make the Berkshire a much larger pig than it is. In this case, it would be essential to modify the existing description of the head, ears, and face.

There is another point which may be referred to—the colour of the skin; according to the points of excellence it should be black, with white markings on the face, the feet, and the tip of the tail. There is no reference to the plum-tinted black to which we have referred, although the point is of marked importance. If these fancy marks are retained, an increase in the size of the pig with the retention of its present excellent quality will be extremely difficult, if not quite impossible. There is no merit in marking whatever—it

has been more or less fixed for so long that it may denote purity of breed but no more—it is, however, well known that in breeding a large proportion of the pigs are mismarked, and that prize specimens are not infrequently faulty.

The remaining points are as follow: Fine, long, and abundant hair, especially on the mane; a fine unwrinkled skin; width between the eyes; a broad snout, and full jowl. In a fat or moderately fat pig the neck, which should be moderately long, bends over to the forehead instead of sloping in one almost unbroken line to the snout; the shoulders are fine, sloped well backwards; the back long and straight; the ribs deep and well sprung, giving width from back to belly, where the underline should be straight from the throat backwards; the hams are wide and deep, furnished right down to the hocks; the legs short, strong, straight, and set squarely on the body; the loin should be wide and level; the tail fine, of medium size, and set high. The pig should present a compact appearance, and suggest lightness of offal and fineness of bone. The points of greatest importance are the length and width of the back and loins, so far as is consistent with the size of the pig, the depth of the sides, and the form and size of the hams.

Large Black Pigs

Although black pigs of large size have been bred for generations in the two most western counties, in East Anglia and in Sussex, it was not until 1898 that any organized attempt was made to standardize or form them into a breed. Black pigs—apart from the Berkshire—had been exhibited for many years by breeders in Dorset, Essex, and Suffolk; but in all cases they lacked size, although possessing in a marked degree the form which had become popular in the exhibition ring, and the aptitude to fatten rapidly. These two qualifications were obtained from the Chinese and Neapolitan pigs, which had already effected a great change in the Berkshires and the Whites. The black pigs of the country, however, outside of these types, were still large, but faulty in form and deficient in quality. In process of time—expression having been given by breeders of the Whites and Tamworths, by their improvement and recognition—the breeders of the Large Blacks determined on a similar course of procedure; they therefore formed a Herd Book Society, which is now fifteen years old, and ultimately framed a standard by which judgment of the pig is now governed.

Committees of our live-stock shows are always alert for useful additions to their schedules of prizes, and therefore in due course the Large Blacks appeared in the ring, and have maintained their position as much by their meritorious properties as by their great size and weight.

The Large Black pig of pre-exhibition days was long in body and on the legs, too high off the ground, too flat-sided, and furnished with ears of great size. The hair was, we believe, abundant but coarse, the meat leaner than now, and the process of fattening longer. There can be no doubt about the fact that the constitution of these pigs was good, the life they led ensured it, and that they were prolific. These qualifications have been transmitted to the black pigs of to-day, and they are undoubtedly real. They are large, attain great weights at a much earlier age than formerly, and the sows are prolific breeders and excellent dams; the young pigs grow quickly for pork or bacon, maturing early, and making the most of their food. The meat they produce is very much what the butcher and the bacon curer require—broad, deep hams, containing a large quantity of tender lean and a smaller quantity of rich fat; deep thick bellies, with an agreeable proportion of the “streaky” loins and back, with well-arranged quantities of lean and fat making suitable bacon for boiling. It is equally important that the less valuable parts of the carcass should be well furnished but of smaller size—these in the hands of the butcher chiefly providing sausage meat—and here the Large Black can be relied upon when it has been well bred. As a pig for crossing upon the common swine of the country, too, it is of great value, imparting size, constitution, and quality, with the early-maturing propensity. Common sows, such as are kept by labouring men, usually err in form—sometimes by smallness of size and almost invariably by slow feeding—which makes the meat more costly to produce. The Large Black will remedy these defects without diminishing the fecundity or the constitution which are characteristic of pigs of this type.

The Large Black may be described as a utilitarian pig owing to its possession of the properties which have been referred to. This was not always the case, inasmuch as before its improvement it was bred on uneconomical lines—in a word, there were pigs of the lean, active, slow-fattening type, which had not been improved by the introduction of imported blood, and there were those to which it had been imparted to excess. In the one case the pigs were of necessity kept much longer on the farm for the purpose of breeding for bacon, while on the other weight was more



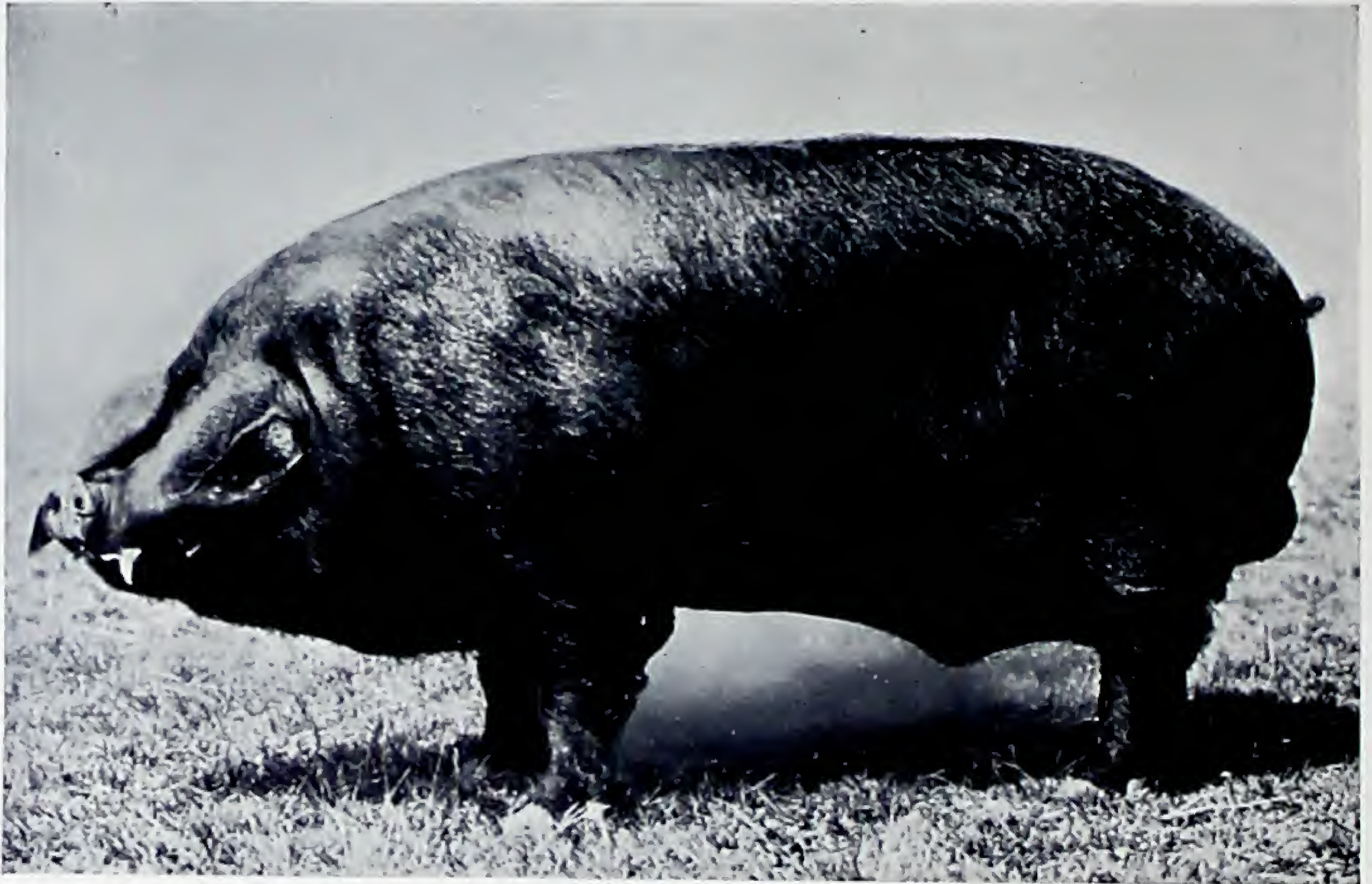


Photo. Babbage

LARGE BLACK BOAR—"HASKETON BLACK KING IV"

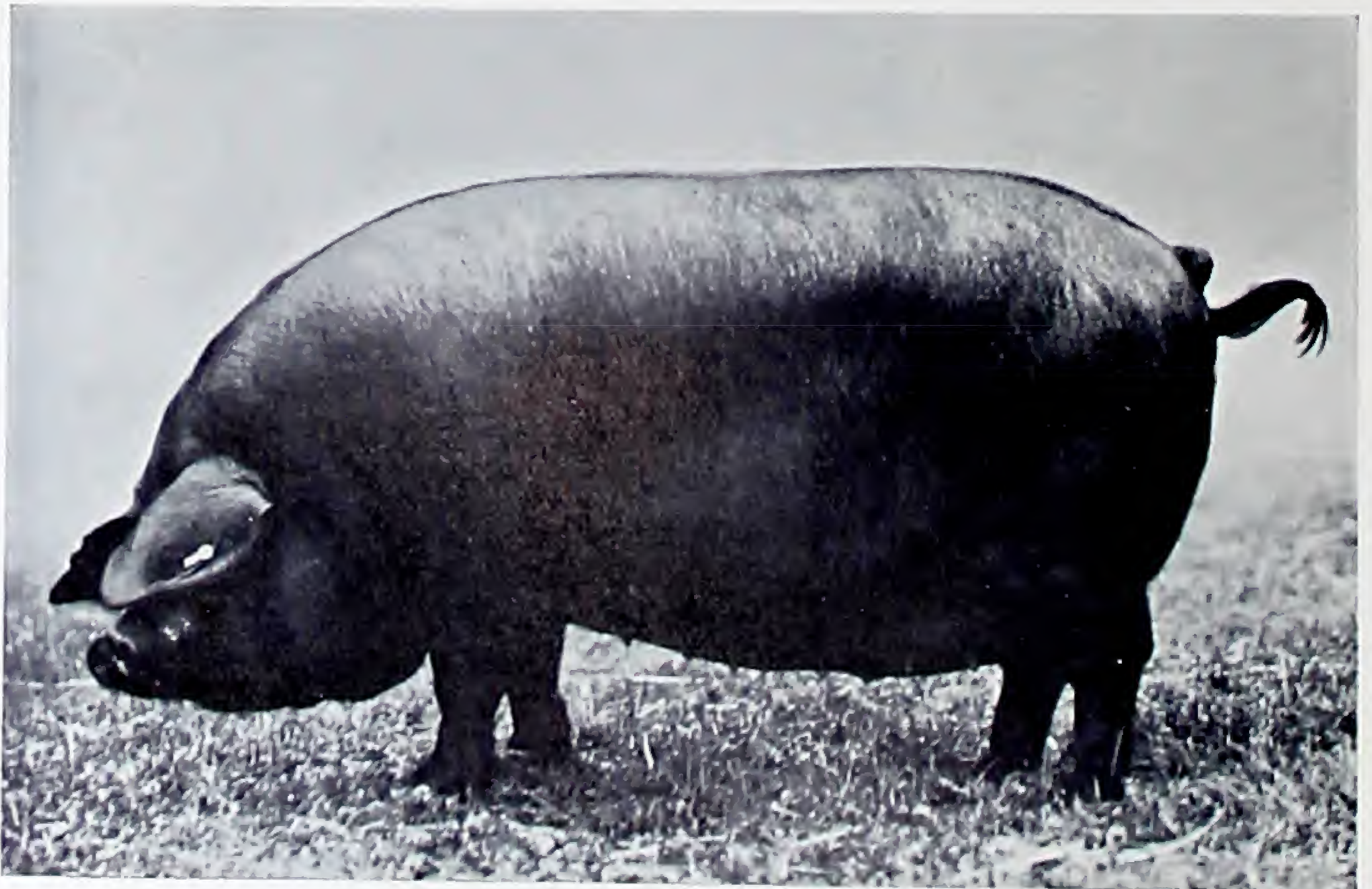


Photo. Babbage

LARGE BLACK SOW—"HASKETON LONG BESS VIII"

rapidly gained, but the fat was excessive. In early days, it is true that farm labourers, and others among the rural population who depended on the pig for the only meat which was placed upon their tables, preferred a large quantity of fat, and the teaching of modern science as well as daily experience proves that they were economically right, especially when consuming it in winter. The ideal Large Black pig combines size—by which we mean height, length, and breadth of body, with natural uniformity—with fresh condition, without excessive fatness. A small-framed pig may, by high feeding, grow into a large one, but it will never possess the height and length of a large breed. With these points should be depth of body from the top to the under-line with proportionate hams and loins.

A few facts may be supplied to show the weights attained by the Large Blacks at Smithfield. In 1902 the heaviest pair of pigs not exceeding nine months weighed 6 cwt. 2 qr. 12 lb., or 370 lb. each, at the age of 8 months 1 week and 1 day. In the class for pigs between nine and twelve months old the heaviest pair weighed 8 cwt. 1 qr. 4 lb., or 464 lb. each, at 11 months 3 weeks and 6 days. Although I attended the show I am not prepared to say that these or any of the prize pigs in these classes were the true Large Black breed, for I believe they were not. They complied with the regulations, however, were judged by experienced men, and were awarded the prizes. But I do not think that such an experience is possible to-day, with the existing standard and in the presence of the Black Pig Society. In the class for single Black pigs at the same show the same thing occurred, the winner scaling 400 lb. at the age of 11 months 2 weeks and 6 days. We come, however, to a more recent exhibition of the breed at Smithfield in 1911, when much superior weights were attained. The heaviest pair not exceeding nine months scaled 495 lb. at the age of 8 months 3 weeks and 6 days, these hailing from Devon, while a second pair bred in Cambridge were almost as heavy. In the class for pigs between nine and twelve months every lot exceeded 9 cwt., or over 500 lb. per pig, while the winning pen scaled 10 cwt. 1 qr. 1 lb., or 574 lb. each at the age of 10 months 3 weeks and 4 days; the whole of the pigs in both classes, unlike the winners in 1902, having pedigrees recorded. Although pens of Large Whites and Lincolnshires exceeded 9 cwt. none reached the weight to which we have referred. At this exhibition pigs were shown by breeders residing in Suffolk, Devon, and Cambridge.

The points of the breed may next be discussed. Examined from the side the form of the Large Black cannot compare, from

the point of view of symmetry, with the Berkshire or the White varieties. It more closely resembles the primitive pig of the farm, with its lengthy frame, large ears, and its elongated head, and slope from the shoulders. The Large Black, indeed, has no pretension to the type which has so long been famous in the show ring. It is a fact, however, which is worthy of remark, that the nearer we get to the show type in our practical piggery the less useful is the bacon produced. It must, however, be added that the chief function of a pure race is the improvement of the "scrub"—the mongrel pig—with nothing but its vitality and fertility to recommend it. According to the standard of the Large Black Breed Society the head should be of medium length, with plenty of width between the ears, which should be long and thin and carried well over the cheeks. There is no dishing of the face or shortness of snout, while the jowl is of medium size. The neck is strong and of medium length; the chest deep, with plenty of width; the back broad, level, and long, the line being as straight as possible from the shoulders to the root of the tail. The symmetry of the pig is usually marred by the way in which he carries his head, which is usually too near the ground. On the other hand, when he is drawn by an artist he is usually placed in a position which is unnatural, and which is in consequence less satisfactory still, although breeders appear to prefer it. The sides should be deep and the ribs well sprung, and greater depth than is common would be found advantageous, besides giving a more massive appearance. The loin is broad, not only adding to the strength and vitality of the pig but providing more meat on one of the most desirable parts of the carcass. The quarters should be long and with plenty of width to correspond, but they should not droop, as we find them on almost all pigs of the variety. There should be a roundness as viewed from the side, and this is not only more symmetrical but of much greater value in the constitution of the pig, providing better and wider hams, which should be large and well furnished with meat to the hocks. This point cannot be fully appreciated until a good ham is placed beside a faulty one, from a pig of similar age and size. The legs are straight, short, and strong; the belly thick; the skin is black, fine, soft, and well furnished with fine, straight, silky, black hair. It appears to the Large Black Pig Society that the hair should not be abundant, although so long as it is of fine quality there cannot be any practical objection to this. Coarse hair is indicative of coarseness, and lack of quality of meat, and plenty of lean; on the contrary, deficient hair indicates deficient lean, and too great an aptitude to lay on fat; plenty of fine hair, however, is desirable, inasmuch as it practically ensures the

production of those points which are associated with it, and prevents either extreme.

Great care is now taken to prevent impurity in the Large Black breed. No pig can be entered in the Herd Book if there has been a cross with any other breed for four generations, nor is a pig eligible if it shows a white mark on its skin or white hair. Thus, where it is desired to register a pig, it is necessary to furnish the names and numbers of the sire and dam, and where the owner who applies for registration is not the breeder, the correctness of the description must be certified by the breeder's signature. Where it is desired to register a boar or sow, this must be done within twelve months of its birth, or at the time of service. Should the age be exceeded, however, entry may still be effected on payment of double fees. The ordinary fees are 5s. each for boars and 2s. 6d. for sows.

Large White Pigs

No breed of pigs has been so popular in these islands as the Large White, nor has any other variety been used to so large an extent in the improvement of the pigs of other countries. It possesses, when at its best, all the qualities which are calculated to produce abundance of fine meat, and to repay the breeder and feeder for his pains. It was freely used by the Danes in building their great bacon industry, as well as by the Germans, the French, and the Americans; and although the results which have been achieved by Italian and Swiss farmers by its aid are, as we have seen, comparatively poor, the reason is probably found in the poverty of the native pigs of those countries, deficient knowledge on the part of breeders, and to some extent in the fact that they failed to buy the best.

The Large White may be described as a prolific hardy pig of good constitution and good temper, of a shape adapted to the production of the most useful sides of bacon, and such as can be modified to meet the requirements of the curer or the pork butcher. The sows are good dams, producing large litters of strong pigs, which grow with great rapidity. They are good growers and good feeders at all ages, making the most of their food, and producing soon after weaning 1 lb. of live weight from 4 lb. of good meal. Where good specimens are used for stock, the breeder can depend upon obtaining good pigs, but where, as is so often the case, the weakling of a litter is kept for this purpose, disappointment is the

result. Failures in breeding from inferior pigs have been the frequent cause of complaints of the breed on the part of those who have bred from inferior stock without knowing the fact.

It is believed, although there is no direct evidence in proof, that the Large White was produced by crossing selected pigs of the large type of the north of England with the Chinese. The first specimens publicly shown were the produce of Joseph Tuley, a weaver of Keighley, where twenty years later we saw many good animals of the then established variety at several of the summer shows held in that part of Yorkshire, notably at Keighley, Bingley, Skipton, and Otley. The success of Tuley at the Royal show at Windsor was followed by a boom specimen of the new variety, specimens of which realized large sums of money. Although Tuley was the originator, it was Mr. Wainman of Carhead and his clever manager, Mr. John Fisher, who, by their skill and enterprise as breeders and exhibitors, really made the white pigs popular, supplying stock to breeders in all parts of the country, and establishing strains which are maintained to this day. It is to John Fisher that the writer owes many thanks for facts supplied before his death now so many years ago. Pigs of the Tuley blood were frequently fed up to 35 st. in a year. The fact of their precocious growth and their ability to lay on fat not too excessive in proportion to lean, enabled breeders to slaughter them at much earlier ages than before. Thus we owe early maturity to the Large White, and with it more tender meat, and as an almost natural sequence increased profits to the feeder. It is true that great weights were attained by the original Large White pig of the country, which sometimes reached 60 to 70 st.; but while the carcass weight was proportionately less than it is to-day, owing to the greater weight of the offal, the carcass itself was less meaty in consequence of the larger percentage of bone. It will be easily understood that our large and coarse native pigs, with their robust constitutions and their great fecundity, when mated with the Chinese variety of widely opposite type, were transformed by the production of progeny which combined the good points of each. While retaining size, vigour, and prolificacy, the new pig fed more rapidly, laid on fat to a greater extent, matured earlier, acquired a kinder disposition, and produced finer and more tender meat. This change, however, was not effected without the exercise of considerable patience and skill on the part of the builders. And so it is that the White pigs—Large, Middle, and Small breeds—were evolved. From time to time it would appear the progeny of a sow threw back to the Chinese; there was the type, but it was modified, while the pig was smaller. To some extent fancy



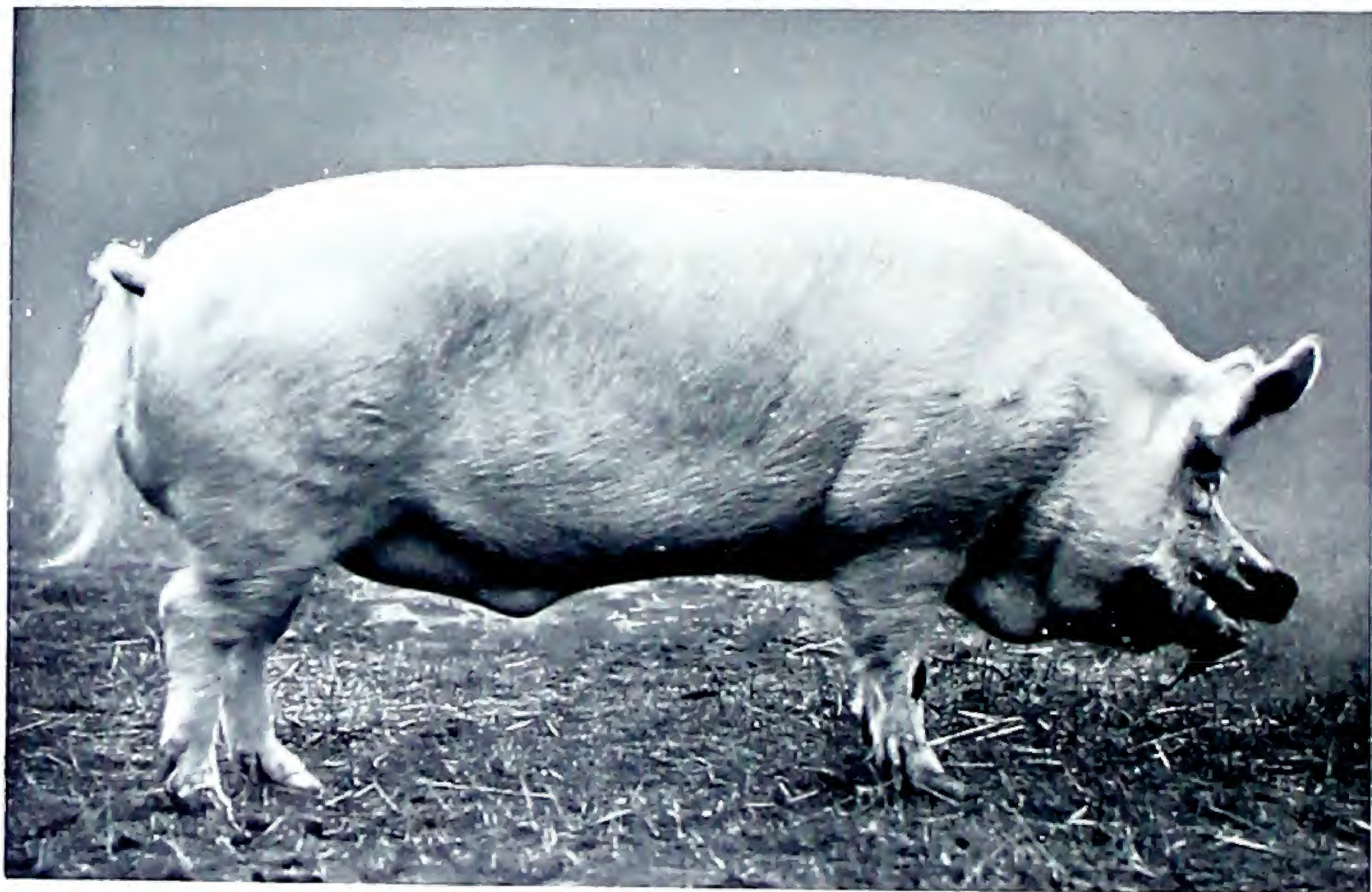


Photo. Babbage

LARGE WHITE BOAR—"BOURNE BANNER"

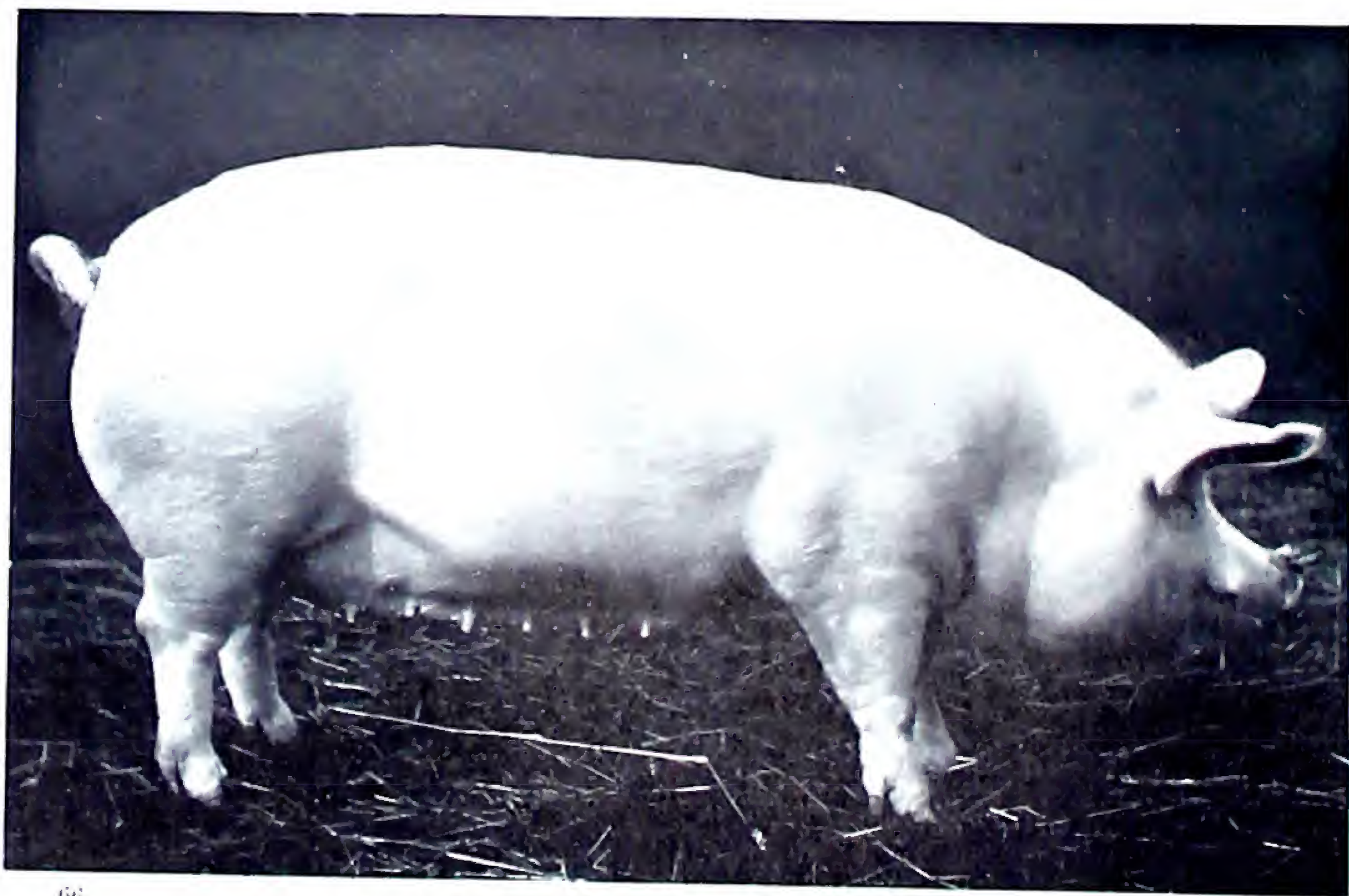


Photo. Parsons

LARGE WHITE SOW—"CALDMORE BUTTERCUP"

ruled, and the small pigs, with their chubby jowls, short dished faces, thick necks, and small ears were canonized and became a recognized breed, crosses between the large and the small producing the Middle White, which, however, was often found in litters of the large pigs until quite recent years. The white pigs, when bred to the best type, reach great weights and produce beautiful hams, deep sides, and thick bellies which provide fine streaky bacon.

Let us briefly look at the weights attained by young pigs exhibited at Smithfield. In 1902, when there was no classification for "Large" Blacks or Lincolnshire pigs, a pen of two Large Whites, aged eight months twenty-seven days, weighed 7 cwt. and 5 lb., averaging $394\frac{1}{2}$ lb. each; three pens of older pigs, averaging eleven months three weeks, varied from 8 cwt. 1 qr. 11 lb. to 8 cwt. 2 qr. 23 lb., or nearly 35 st. each. Curiously a middle-bred sow reached a similar weight at a similar age, although, if memory serves us, the animals were not of the true middle-bred type. Coming down to a later date, 1911, we find the pigs in the younger class had all fallen below 7 cwt., some falling below 6 cwt. On the other hand, all the pens exhibited in the older class, nine to twelve months, exceeded $8\frac{1}{4}$ cwt., one pen scaling 9 cwt. 1 qr. 11 lb., the pigs thus averaging 525 lb. each at the age of ten months three weeks and four days. By this time, however, the Large Blacks and the Lincoln pigs had asserted themselves, the former reaching the greatest weights at the show, while individual pens of both exceeded the heaviest weight attained by the Large Whites. We are bound to express our belief, however, that the position reached by the newer varieties is in large measure due to Large White blood, for its builders had no source from which to obtain the required infusion apart from this breed. Thus the work of the makers and supporters of the Large White has had far-reaching and beneficent results. Inasmuch as sows are not exhibited at fat-stock shows at their greatest weights, there are no means of ascertaining what figures are still reached, but we have little doubt that they are occasionally equal to 90 st., which we have known to be scaled, although they are not fattened to that extent now. The colour of the white varieties may now be regarded as fixed, for although sows sometimes appear in the showyard with black spots on their skins, we remember no instance in a long course of years in which this fault was not accompanied by failure in type. At the great summer shows these failures are fatal to success, no judge of a pig venturing to award them a prize. At the fat-stock shows in winter, however, for some unexplained reason, there is not the

same prudence displayed in making the awards, and pigs with black spots are sometimes awarded prizes.

The points of the Large White are as follow: Hair white, long, fairly abundant, fine and silky. Skin white, quite free from black or colour of any kind. Head rather long, wide between the ears, the jowl small. Ears long, fine, thin, inclining slightly forward, and fringed with hair. Neck long, but not fat or coarse; chest wide and deep. Legs straight, flat, and well set-on; the pasterns short and springy, and the feet strong. The back is straight, level, wide, and long, with a broad loin; the ribs are deep and well sprung; the sides deep; the flank thick and well down; the belly full, furnished with twelve teats, and providing a straight underline. The quarters are long, wide, and straight when viewed from the side; the hams broad, full, and well furnished to the hocks; and the tail long and stout, but not coarse, furnished with fine hair. A well-bred pig should be symmetrical, and without the too common carriage of the head at a low angle when the shoulders are rounded and the jaws near the earth.

Among the faults of imperfect pigs the following are the most prominent, all being such that no pig possessing either should be used for stock: A curly or bristly coat, a short head, dished face, short snout, short prick ears, short thick neck, short body or flanks, hollow back, coarse hair, especially the mane, narrow head, chest, or back, heavy, wide, or open shoulders, flat ribs, and short girth round the heart, drooping or short quarters, light hams, legs which are weak, coarse in bone, or unsymmetrical, or splayed feet. A pig should be well balanced and free from prominent points. A boar should not be ruptured, nor a sow with deficient teats. With regard to size, it is of greater importance to use a large sow than a large boar. The male should possess the points of quality in any case, and the female the size. Unless she is roomy she cannot produce large pigs; while in both the boar and the sow there should be ample room in the thorax for the free play of the vital organs, the heart and lungs in particular. It may be remarked that fine hair in abundance denotes constitution as well as good quality of flesh and a fair proportion of lean meat. Some strains of Large Whites are almost hairless, and we have noticed that these pigs are almost invariably too fat. Bristly hair on the contrary is usually accompanied with too little fat and coarse meat, and too great a desire to roam. The form of the Large White, which we believe to have contributed to the improvement of pigs throughout the world, secures thick bacon with sufficient lean. Length of body gives an ample proportion of the best

meat both on the loin and the flank, and a minimum of the poorest meat.

Lincolnshire Curly-coated Pigs

The canonization of the Lincoln pig as late as the twentieth century is an event which is as remarkable in its way as was the establishment of the Large White fifty years earlier. Whether those who have brought it to its present standard have utilized the blood of the improved swine of the neighbouring county I do not venture to say, but it is remarkable that during all these years Lincoln men should have kept to a type of their own. There is ample room for two varieties of a large white pig, and all things considered, the production of the younger breed is all for the best. Had there been competition of this character in earlier days, the Large White would have become a better pig than it is, both in numbers and size, for, admitting the great merits of individual specimens, the average pig of the variety is seldom meritorious. The advent of the Lincoln, with its great size and its fine qualities, must be attended with benefit to the whole industry—the breeders of the Large White will be stimulated to look after their laurels. A larger number of stock boars of the best type, combining size with quality, will be placed at the disposal of the breeder, and with time there will be a distinct improvement in the size of our sows—a matter of great importance, for the quantity of pig meat produced depends largely upon it. The greater the size of the average breeding sow, the larger the number and size of the pigs which she breeds at each litter, and the greater the weight of the meat ultimately produced.

The Lincolnshire pig has been long bred in the county which gives it its name, but it has been produced solely for meat, bacon in particular. It is, of course, obvious that a type of pig which has not been bred to a standard, which possessed no pedigree, and not even a name, could not be sent out for the improvement of pigs in other districts, as no dependence could be placed upon the results. When, however, it was decided to establish a breed, to fix a type on the basis of a formulated standard, and to exhibit at the great live-stock exhibitions, the question assumed a different aspect, and the action taken by Lincolnshire men has been fully warranted by the result.

The Lincolnshire Curly-coated pig is well adapted for the production of bacon—its length and depth, combined with its precocity

and the fine quality of its meat, make it the most dangerous competitor against which the older white breeds have had yet to contend. But we do not like the name. It is amply sufficient to describe it as the Lincolnshire pig, without remarking upon the fact that it has a curly coat—a matter of quite minor importance. The Tamworth is known to be red, and the Berkshire to be black and white, while there is no other Lincolnshire pig from which to distinguish it. I have long held that the export trade in British agricultural produce needs special attention, and in no department is this fact more pronounced than in the case of the pig. There are no large breeds in Europe or America apart from our own; and as size is perhaps the greatest of all factors in securing sales—and I speak as one who has acted as an international judge—there should be a great and prosperous future before the Lincolnshire breed. One of the best means of securing its recognition and proving its value to foreign buyers is its exhibition at international shows. I am able to speak with knowledge of the fact that in France and Germany, in Italy and Switzerland, Denmark and Sweden, Large White pigs of British breeding are regarded with high favour, and that they are more or less difficult to get. Such, too, as I have seen on the farm in most of these countries have not been a credit to the breed or to the English name, and I am satisfied that the introduction of Lincolns of the very best type will not only meet with approval but will ensure future trade. To sell a foreign buyer, however, who has seen the right type, a pig of second class, is a sure way of closing the business.

The Lincolnshire is a hardy, early-maturing pig, which grows rapidly and makes great gains in weight in a short time. I was able to see something of what was done by a large farmer with the local pig some time before the establishment of the Lincolnshire Pig Breeders' Association, and although I doubt the wisdom of fattening adult pigs to great weights for the benefit of the labourers on the farm, this pig was of the right type for the purpose. It can, indeed, be matured fat enough for bacon at an early age, when it is by far the most profitable, or it can be kept as a store and fed as an adult to a great weight. In the first case, however, as we shall see, it makes a high daily gain; while in the second, although no data are available, there can be no doubt about the belief that the profit is small, if indeed, as is so often the case with other varieties, there is not an actual loss. So far as we have gone, the Lincoln pig has accomplished remarkable things. It has been pointed out by Douglas, in *The Meat Industry*, that whereas ten pigs competing at Smithfield in 1908, in the class for pigs between

220 lb. and 300 lb. live weight, averaged 215 lb. at 316 days old, having gained 10.9 oz. per day since their birth, ten Lincoln pigs which were eligible for the same class weighed 178 lb. each at 161 days, thus making an average daily gain of 1 lb. 1.68 oz.

Let us, however, refer to special results obtained in a more recent year. In 1911 five pairs of Lincoln pigs between nine and twelve months old averaged 8 cwt. 2 qr. and 22 lb. per pen, or 487 lb. per pig. The heaviest pen reached 9 cwt. 3 qr. 14 lb., or 553 lb. per pig at the age of eleven months. Against this, what was accomplished by other varieties? The heaviest pen of Berkshires was 8 cwt. 3 qr. 6 lb., or 493 lb. per pig at eleven months and four weeks, and fat Berkshires at Smithfield are, in our experience, much too fat to be profitable, owing to their smaller size. The heaviest pen of Large Whites was 9 cwt. 1 qr. 14 lb., and of Tamworths 9 cwt. 0 qr. 12 lb. The one pen which exceeded the Lincolns in weight was of the Large Black breed, which scaled 10 cwt. 1 qr. 1 lb., but these pigs were three weeks and four days older. In the younger class for pigs under nine months old, the heaviest pen of Lincolns scaled 7 cwt. and 2 lb., or 393 lb. each at seven months and four weeks, easily beating the Large Whites, the Tamworths, and the Berkshires, their weights being alone inferior to those of the Large Blacks. At this early date in their career the Lincolns have established themselves as the heaviest white variety, and well adapted both for the home and the foreign trade.

The points of the breed are as follows: Coat white and fine, the hair not too abundant but curly or wavy, straight or coarse hair being objectionable; the skin is white and soft; the head of medium length, wide between the ears, a long snout or dished face being contrary to type. The neck is of medium length; the ears not large as compared with the size of the pig, but of medium length and bent over the face, matching the carriage of the head; the line of the jaws being practically on a line with the belly; the chest, as it should be in all breeds, is wide and deep; the back long and straight, the line sloping from the top of the shoulders to the forehead, and making a symmetrical curve; the ribs are well sprung to correspond with the size of the body; the sides are deep, giving width to the flitch; the loin is broad and strong; the quarters long and wide, forming a curve from the rump to the hocks when viewed from the side; the hams are deep, thick, and full to the hocks; the legs are short and straight; the tail thick and set high; and the belly is thick and well filled. Great stress is laid upon the width of the shoulders and the formation of the hams.

Middle White Pigs

The Middle White pig was produced by crossing the Small with the Large White, with the result that there were some who disputed its claim to purity. When pigs of this cross were first exhibited they were regarded as too small to compete in the Large White classes and too large for the Small White classes. Their merits, however, were so great that there was no course open but that of accepting them as they were, and describing them as pigs of the Middle breed. The white pigs have long been regarded as members of one family, divided only by their size. Produced in the same county, and to a large extent by the same men, they were all regarded as Yorks, although this title no longer obtains. When, however, we examine the points of the large breed and compare them with those of the small breed, we shall find wide divergence. There is not only a very marked difference in the size and the form of the head, ears, neck, and hair, but the whole economy of the two breeds is opposed. In the large breed we have the beau-ideal of an economical pig with practically every desirable qualification—quantity of meat, quality of flesh, including a proper proportion of lean to fat, rapid growth, abundance on the best parts of the carcass, i.e. hams, loins, and bellies, and a paucity on the worst parts, such as the fore end. On the other hand, the small breed, which has latterly become a toy, is slow in growth, never produces a great weight of flesh, nor meat of a desirable character. The fat is much in excess as well on the best parts of the carcass as on the worst, which are much too pronounced, the collar in particular being short and thick. A pair of hams or a side of bacon produced by a Small White of correct type is probably worth less than half the money value of the same parts of the carcass of a Large White at the same age, although it may have cost as much for food.

It may be supposed that the Middle White produced by a cross between these two breeds, the one with meritorious properties which are entirely wanting in the other, would scarcely be regarded as an economical pig. To some extent, however, breeders have improved its original type and given it a more practical character. Middle-bred pigs of the exhibition type have always been too closely allied to the small breed in relation to head, and it has sometimes happened that on account of their size they have appeared in a Large White pen. Their chief value is found in their use for crossing on sows of old type. Thus a pig with great length

of body and head, large ears, and long neck, coarse hair, and slow growth, which never lays on a sufficient quantity of fat while still young, is immensely improved by crossing with the Middle White. The defects in the progeny of a sow of this type are corrected, and more rapid growth, greater carcass weight to live weight, better meat, and a large proportion on the best parts are ensured. For this purpose the Middle-bred White is, in the judgment of the writer, better adapted than the Berkshire, which leaves a less-marked imprint on the young. The points to which we have referred are found, it is true, upon the large breeds in which they are now allied to size, but we do not believe there is the same prepotency to transmit them to the offspring of a sow such as we have described as exists in the Middle White.

It is doubtful whether any pig is bred to such great perfection of form as the Middle White, viewed from the side. Smaller in size than the large varieties, it weighs equally well in proportion—some specimens, indeed, would appear to weigh better, scaling, as they have done, 86 to 90 per cent carcass weight. The sows are excellent mothers, gentle with their young, and permitting the attendant to handle them almost at will, even so far as to examine their teeth. They fat with great freedom, are soon ready for the butcher, and cut up remarkably well. Where a butcher has been accustomed to pigs of the Berkshire type, he has been surprised at the carcasses of the Middle Whites, which he has been induced to purchase almost against his will. There is, however, one possible fault. We have remarked upon their fattening properties, they are apt to lay on too much fat unless they are carefully bred, but it is this property which has adapted them for so long a period for improving common pigs of a leaner character. They graze well, and make just as good use of green food as of meal; they are not difficult to keep within bounds—a fair-sized grass run contenting them, and they are therefore easily induced to stay at home. Some breeders take litters from their gilts at the end of a year, inasmuch as they come into use very early, although the practice cannot be recommended for a pig of large size, and the Middle White is a large pig. Although not equal to what are known as the large varieties, the sow requires time to mature, which she cannot do if, as she approaches maturity, she is carrying her young.

The Middle Whites as good feeders require less food than pigs of no breed, and it is questionable whether pigs of any pure breed will maintain their condition so well upon so small a quantity. A sow may be fresh, and in order to maintain this freshness it

is not necessary to feed her with profuse liberality; if it is summer, she will find all she needs upon a pasture supplemented by a few handfuls of corn. In winter, on the other hand, a few mangels or swedes, in addition to the corn, are all that she requires. The Middle White is small in the bone, while the offal removed after killing weighs less than the average. A good sow will measure 6 ft. from the forehead to the root of the tail, her flanks will be deep, her loin broad, and her hind quarters wide apart, making room for good hams. The belly is thick, providing for good streaky breakfast bacon if the fat is kept down, while, by careful breeding—and this is important with all varieties, for faults quickly crop up—the shoulders and neck will be light enough for ordinary purposes, although in exhibition pigs of the popular type the collar is too heavy, in this respect matching the head as in the Small White breed. The head of an adult Middle White pig of the best type, when viewed from the side, exhibits a straight dip from the forehead to the base of the snout, which is short and slightly inclined upwards to the end of the stop. Longer than that of the Small White, it may be described as half-way between the point in that variety and the snout of the Large White. The forehead is wide, the ears being of medium length and carried very slightly forwards, not pricked on the one hand or horizontal on the other; the jowls short, thick, and broad, almost giving the cheeks a puffed appearance when viewed from the front, and discounting the width of the forehead.

We may now describe the points of the breed. The colour of the skin and hair is white, the latter long and silky. Black or blue patches are no longer permissible; the ears are fringed with fine hair; the neck is of medium length; the shoulders fine, level, and not too wide; the chest wide with plenty of depth; the sides deep and long; the ribs well sprung, giving plenty of room; the flank thick and well down; the back long from neck to rump, straight and wide, with well-furnished, broad loins; the belly showing a straight underline, thick and full; the quarters long and wide; the tail of medium length, fine, set high, and supplied with a tassel of fine hair. The legs are straight, set well on the four corners of the body, and furnished with fine bone; the feet strong, wide, and level; the pasterns short and springy; the hams broad, deep, and well furnished to the hocks. There should be no mane, black hairs, or wrinkles on the skin, and an entire absence of hollowness on the shoulders or the back.

Small White Pigs

If the Small White variety has not disappeared altogether as a breed, it is no longer classified at the leading exhibitions of the live stock of the farm. If these meetings were to remain practical, there was no other course, for it had become a mere toy, although a somewhat remarkable one. What the bull dog has become among dogs, the bantam among poultry, and the owl among pigeons, the Small White had become in the hands of its admirers, a pig remarkable for the formation of its head, the quantity and character of its hair, the fineness of its bone, its small offal—the two latter being excellent points—the shortness of its legs, the excessive fatness of its carcass, and the smallness of its size.

The history of the Small White dates back to the first quarter of the nineteenth century, when a small pig was produced—it is believed by the aid of the Chinese—which effected marked improvement in the coarse and unprofitable pigs of the north of England. It reduced their lankiness, gave thickness to their flanks and belly, reduced the offal, and induced them to fatten on less food and at an earlier period. Selected specimens of this type of pig were undoubtedly used in the production of what was for some years described as the Prince Consort's breed, and they are known to have exerted great influence in the production of the modern Small White, earlier known as the Small White Yorks. Thus the Chinese was instrumental in establishing all the older white breeds of English pigs, and through them the Large Black and the Lincolnshire breed, while in all probability the Berkshire owes its most salient points to the same blood. The Prince Consort's breed no longer exists, it has gone the way of the Dorset and the Suffolk; although the two latter have been exhibited in the great showyards of the country at much later dates, and within our own recollection, by Mr. Coate and Mr. Sexton. Both Suffolks and Dorsets, however, were larger than the Small White, and both were excessively fat, the proportion of lean meat being too small. The White Suffolks, for they were bred and exhibited both as Blacks and Whites, were less typical of the small breed than the Small Whites; the hair was smaller in quantity, the head longer, and the ears larger; nor were they so close to the ground, a point which makes locomotion difficult for pigs of the small breed.

Briefly, the Small White, bred pure, for bacon or pork is an impossible pig. It must be kept a greater length of time than is desirable, in order to obtain sides which are approximately large

enough for the curer; the meat is too fat to please the consumer, and consequently it realizes a lower price, while the quality is reduced by late maturity. If we add that in any case the cost of production under ordinary conditions leaves no profit behind at normal market prices, we shall realize the fact that the breed is not an economical one, and cannot be recommended to farmers or pig-keepers. It is quite true that the Small White may be used with advantage as already described; but much better results can be obtained by the use of the Middle White, which, while importing all the good properties common to the small breed, possesses the advantage of size.

The points of the small breed are as follow: The colour of the skin and hair white, without spot or blemish; the skin fine; the hair long, fine, and silky. In some strains it has a tendency to curl or to lie in waves, but this is not a characteristic. The head is broad between the ears, although, owing to its shortness and to the width of the face, it appears narrower than it is; the face is dished; the snout short, broad, and turned up; the jowl full and broad; the ears small, short, and pricked; the neck thicker and shorter than in any other variety; the shoulders wide and full; the chest broad; the back broad, straight, and well filled; the loin wide; the tail fine, small, set high, and finishing with a tassel of fine hair; the sides deep, and the ribs well sprung; the belly deep, thick, and near the ground; the flank thick and well down; the legs short, fine in the bone, and set well outside the body; the pasterns short, and the feet small and well formed. The quarters should not slope, but be wide and full, and the hams deep, full, thick, and well formed. The general appearance of the pig is *multum in parvo*—small and compact. Excessive fatness should disqualify in competition, whether for killing or breeding.

Tamworth Pigs

The progress of the Tamworth pig may be dated from its inclusion in the prize list of the Royal Agricultural Society at the instance of the late Mr. G. Mander Allender, and I well remember the enthusiasm he displayed with his herd. That step was a good one, for the variety had long been known and bred in Warwickshire and Staffordshire—indeed, at one time it had been called the Staffordshire breed—with considerable success by men who for a generation had preferred it to the Yorkshire or Berkshire breeds. There is reason to believe, from the evidence

which I collected for the *Book of the Pig*, that the earliest Tamworths on record were long of limb, active, vigorous animals, which were able when at liberty to earn their own living and to produce a large number of pigs at a birth. They were slow feeders, maturing late, and producing a larger proportion of lean meat than is usual to-day. Crossed with the Berkshire, which, although an improved pig, was incomparably inferior to the existing type, its form was improved as well as its fattening properties, but, strange to say, the colours of each of these breeds were reproduced in the young practically unchanged—a fact which suggested the ancient character and prepotency of each variety.

Some twenty years ago I had the advantage of discussing the history of the Tamworth with the late Mr. John Lane, treasurer of the Birmingham Fat Stock Society, who was then nearly eighty years of age, and whose father had been a breeder of the variety early in the century. I am, indeed, unable to trace any evidence earlier than this. Mr. Lane regarded the Tamworth as a distinct variety, and, contrary to the evidence of writers upon the pig about the middle of the century, he remarked that in his earliest recollection it was a sandy-red in colour without spots, prolific, and able to attain great weights by feeding after producing several litters of pigs. Mr. Lane, indeed, had frequently known sows to attain a weight of 800 lb. It was in its primitive form of much less value than the modern breed, being required to find its own living in summer and autumn. In spite of this fact the Warwickshire breeders regarded it with considerable favour, believing that it earned money more quickly than the pigs of any other type. It is probably true that as black pigs flourished a century ago in the west and east of England and white pigs in the north, so did the red pig in the two counties we have named. But this fact does not confer upon it the dignity of a pure variety, which, like the cattle, sheep, and pigs of modern farming, had been bred with a pedigree and to a standard.

It has been said that the early Tamworths produced too many pigs at a litter. This fact we can fully believe, but it was not confined to the red variety. I remember another local type of pig in Bedfordshire which, prior to improvement by the introduction of the Yorkshire breeds, sometimes produced from thirteen to nineteen pigs, but always of a type which was undesirable. Experience suggests that the abnormally-prolific pig was long, lean, lanky, and furnished with large ears and a wedge-shaped head, and that her progeny, when containing the blood of a pure variety, no longer followed her example.

Tamworth pigs have perhaps been more popular at the Birmingham Fat Cattle Show than at any other exhibition, and for many years we examined them carefully. Although the standard colour is a sandy or golden red, it will be noticed by all careful and interested observers that the great majority of the pigs of this variety become a grey or grizzled red with age, the brightness of the colour disappearing, dark patches of hair sometimes adding to their changed appearance. This fact carries us back to the description written now fifty years ago, in which it was remarked that at that time Tamworths were red or *red and black*. There can be no doubt that sandy-red was the typical colour, but we have seen so many pigs of the breed at the great stock exhibitions during the past thirty-five years which bore traces of black that we cannot altogether dismiss this evidence. In speaking of the prolific character of the Tamworth, Mr. Allender remarked to the writer that, having crossed it with one of the white breeds, a sow produced fifty fine pigs by the time she had reached the age of twenty-two months, which means that she must have been used for breeding very early. This well-known breeder found the Tamworth a productive and useful bacon pig, providing deep, lengthy sides, which were not so fat as those of the Berkshire, and it was because of these facts that he replaced the latter variety by the former. Not only were the sides excellent and large for the age of the pigs, but the hams were equally so, and on one occasion Mr. Allender informed me that he had hams hanging which, after smoking and drying, weighed 20 lb. each, although cut from the carcasses of pigs which were only twenty-seven weeks old. Tamworths of this strain of blood produced most excellent meat, which could be depended upon to provide a large proportion of lean, and it was remarked by a butcher, to whom some were sold, that they were the best from this point of view of the many prize pens which he had purchased. One of the oldest breeders of the Tamworth, who could carry back his memory to 1825, informed the writer about the year 1883 that the variety had changed considerably, especially during his later years. In his recollection the colour was dark-red, the form lean in character, and the head long and sharp. The colour had, he believed, been modified by crossing with white varieties into a lighter shade, which he could not regard as correct, although it was more popular. This suggestion, however, which is not borne out by evidence, is scarcely tenable, for it does not account for the undoubted tinge in the colour which almost all Tamworths displayed in their second and succeeding years, and which even now is not exceptional. Again, one of the

oldest breeders of those early days found the Tamworth extremely prolific, producing litters which were larger than the average litters of the more popular varieties, and pigs which, owing partly to the good milking power of their dams, realized substantial prices after weaning. In some yards the gilts were mated with the boar at a very early age, for it was a characteristic of the Tamworth that she was both precocious and strong, although later experience does not warrant the practice. Pigs of some strains of the breed fail to lay on sufficient fat to fit them as porkers or for curing at so early an age as the Berkshires or the Whites, the food consumed contributing rather to growth than to meat. The fact remains, however, that they will attain great weights and produce bacon which is of the finest quality, the lean being so intimately mixed with the fat that it is both luscious and tender.

Although we regard twelve months as too early an age for a gilt to produce her first litter, there are many Tamworth sows which have farrowed much earlier and brought forth useful pigs. Pigs, however, bred from strong gilts of this variety at the end of their first year are sometimes surprisingly good. We remember one occasion upon which one of the chief prizes of the year was gained by a pen which were born when their dam had reached this age, and which were estimated to weigh 240 lb. apiece in the carcass at the age of five and a half months. A well-known Warwickshire breeder, who in times past bred a large number of black, white, and red pigs, preferred the last-named for two special reasons—the large proportion of lean meat which they produced, and the fact that in the process of feeding they made growth at the same time that they were laying on meat, and always weighed well. The same breeder found that the Tamworth boar made an excellent cross on the Middle York or Berkshire sow.

Viewed from the side the Tamworth differs widely in form from the Berkshire and the white varieties. It is longer in proportion to the depth of its body and higher on the legs. The head is seldom carried horizontally, and it is somewhat too long to be symmetrical, while the line from the loin slopes gently forward to the forehead, not finishing with a somewhat short bend in the neck as it does in the breeds referred to. Again, there is not the same depth of flank or thickness of belly, nor the heavy jowl which is characteristic of pigs with shorter heads. Owing to the general conformation of the pig there is a lack of massiveness, which gives the Tamworth a type of its own, and we have no doubt that to this fact is chiefly owing its distinct power to produce lean meat which is characteristic of the breed.

The points of the breed are as follow: Head a fair length, not long but beyond the medium; straight snout; face wide between the ears, which are inclined to be large, well fringed, and carried slightly forward, but rigid; the neck is muscular, and should correspond in length with the head; the shoulders are slanting, fine, and well set, with a broad deep chest beneath; the back is long and level, the loin broad and strong, the ribs well sprung, the sides long and deep, and the belly deep and straight; the quarters are wide, long, and straight from the hip to the tail, and furnished with full thick hams, meaty to the hocks; the tail is well set and well tasselled with hair; the legs are strong, bony, shapely, and set well outside the body; the skin is flesh-coloured, and the hair a golden-red, free from any tinge of black or white—it is straight, long, and abundant, and of fine quality. The points to avoid in a well-bred herd are coat or skin of any other colour than the standard, large flop or drooping ears, short face, short or turned-up snout, thick collar, hollow back, wrinkled skin, heavy shoulders, or curly hair.

CHAPTER II

THE MANAGEMENT AND FEEDING OF PIGS

BY SANDERS SPENCER

The far too common belief that anyone, however slight his actual knowledge and experience, is capable of the successful management of pigs may be one of the chief causes of the unsatisfactory, as well as insanitary, way in which so large a proportion of the pigs in this country are managed and cared for. There is no denying the fact that of all our domesticated animals, pigs have, as a rule, the least care and attention paid to them. This neglect may arise from several causes, one being the knowledge that pigs, even when grossly neglected, appeared to be possessed of the power of making very considerable progress, progress so great that even profit to a surprisingly large amount periodically accrues to the neglectful owner.

Another reason why so many pigs apparently suffer from the absence of reasonable attention is said to be the periodical fluctuation in the market value of both fat and store pigs. Of this variation in the prices realized for pork and pigs there can be no doubt. The cycle seems to extend over a period of four to five years, its continuance being affected by the state of trade at home and abroad, or the spending power of the mass of those who toil with their hands and so claim to be the working classes, by the yield abroad of certain crops, particularly of the maize crop in the United States, and probably by more than all other causes combined, the marvellous power of increase possessed by the sow. The mare, used for breeding purposes, and the cow, will not average more than one offspring yearly. The ewe may give a slightly higher average return, but it is claimed for sows that they should each breed and rear at least an average of thirteen piglings per annum. Another important point at the present day is that our pigs mature in so much less time than our other quadrupeds. The average life of a pig intended for the butcher

is not much more than seven months, in place of something approaching twice that length of time which was generally lived by the fat pig of some half a century since. There has also been some improvement in the general feeding qualities of the ordinary pig of the country, although there still exists room for great changes in this respect. Then the ease with which so many persons in the country can commence pig-breeding, and avail themselves of the opportunity at those recurring periods when pigs are said to be gold and a source of comparative riches to their owners, lends itself so admirably to that over-supply of pigs which as surely follows a shortage and high prices as does night succeed day. This want of system, this speculative tendency, or whatever it may be, naturally increases the temporary depression which sets in when the supply of pork exceeds the demand, an excess which has been materially added to by the action of the owners of the fat pigs who unwisely endeavour to prevent a decrease in value by withholding a portion of the supplies, and at the same time increasing those supplies by the manufacture of more pork by each pig, supplies too which must be placed on a falling market. The actual state of affairs sooner or later forces itself on the minds of the ordinary pig-keepers, who hasten to dispose of those unprofitable pigs which owe their unhappy condition to the neglect of ordinary care and thought in that business which their owners embarked upon, partially as a speculation and from a desire to grow rich quickly. This mad rush to escape from a position which has ceased to be a source of profit, if it has not become one of loss, has its bright as well as its dark side, since the very general disposal of the breeding sows for slaughter, many of them in little more than ordinary condition, so promptly has its effect on the open market that the temporary return of a profitable condition of affairs on the pig market becomes generally evident, and the same mad rush into pig-breeding follows as a matter of course. At each recurring period of depression advice is freely bestowed upon those who are mainly responsible for the untoward state of affairs, but the warnings and advice are unheeded, and a similar course of procedure brings about more or less promptly that less-profitable period during which pig-keepers are fortunate if their business is not carried on at a loss.

Attempts have frequently been made to discover some system by which advantage could be taken of these great and periodical increases in the value of pigs, and by which the losses inseparable from the great reduction in the value of the pig stock-in-trade can be mitigated, if not entirely avoided. At times considerable

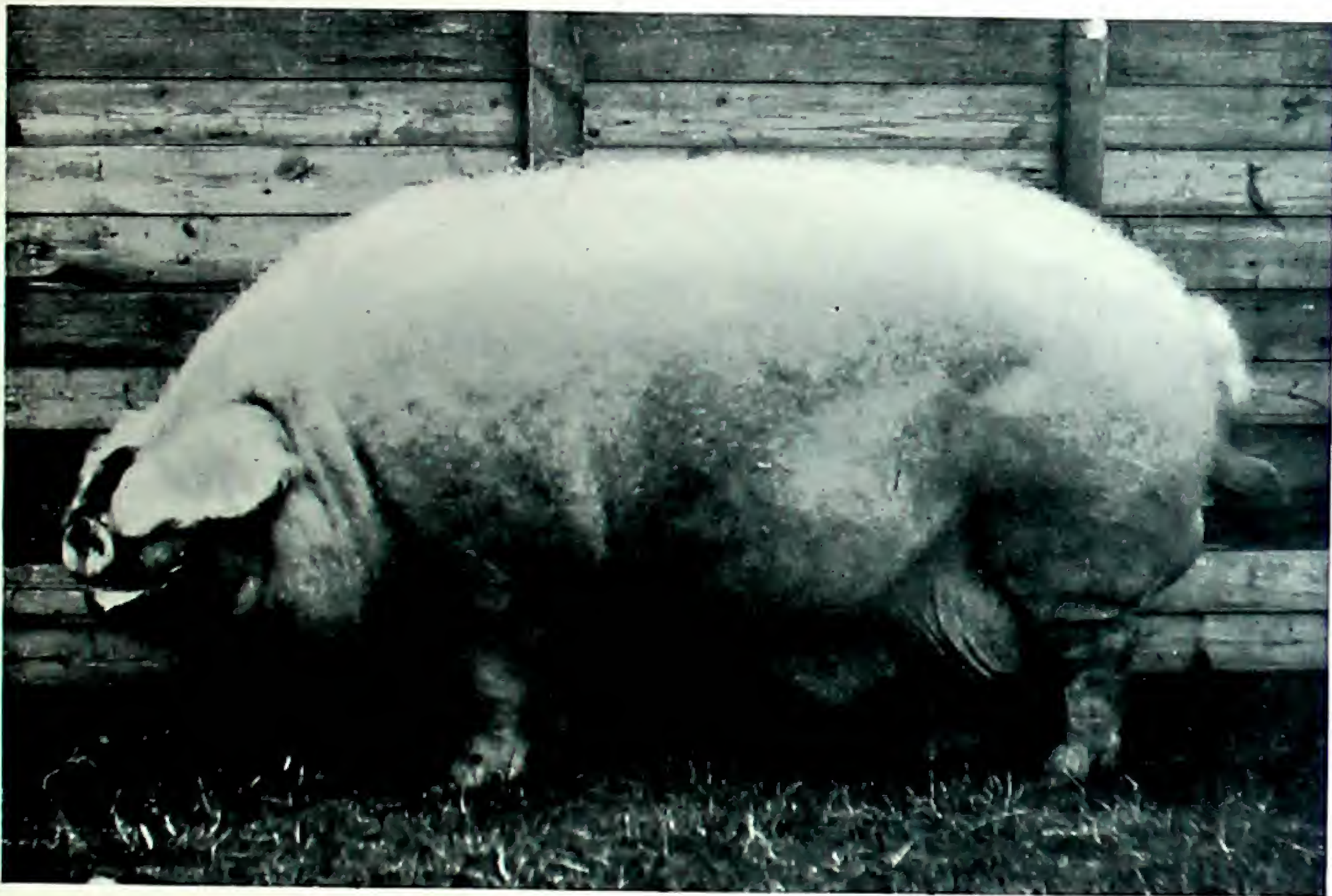


Photo. Parsons

LINCOLNSHIRE CURLY-COATED BOAR—"RUSHTON'S SCORCHER"

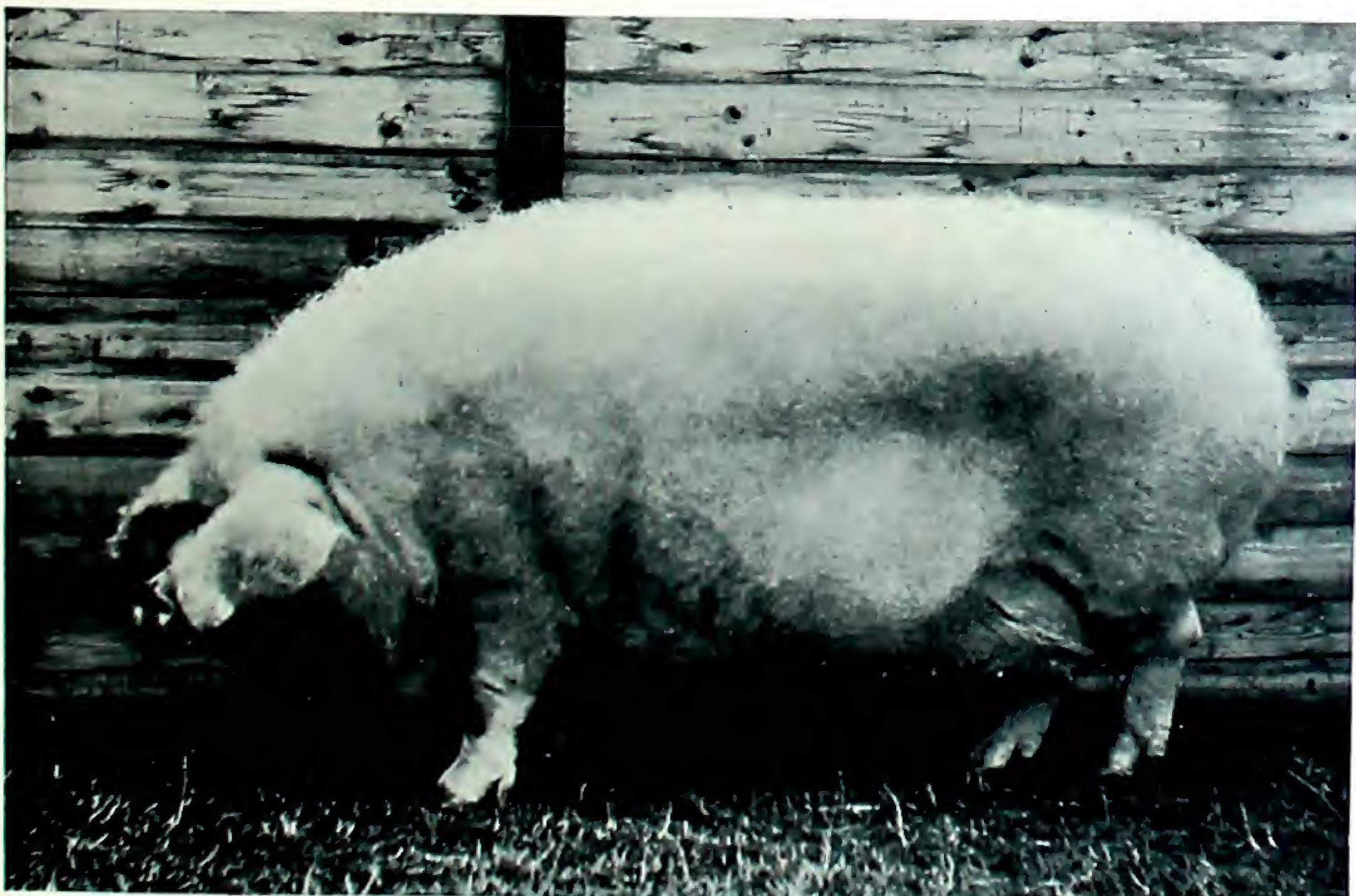


Photo. Parsons

LINCOLNSHIRE CURLY-COATED SOW—"MARSHLAND MARION"



profits have been secured by persons who were able to determine that period when the pendulum was swinging in the direction of a period of high values. Their *modus operandi* is to purchase at a low price a number of young sows, and to keep them until there sets in a demand for in-pig sows, as is sure to be the case after the continuance over a certain period of a depression in value. Others again make purchases of females from selected sows, and keep them for breeding purposes during the period of inflated prices, but in this there is an element of risk in the holding on of the sows for too long a time. It is only natural for the owner of a sow which is paying its way very successfully to desire to keep it for just one more litter, but in too many cases the market breaks with little forewarning. Again, others declare that the system by which the greatest profits are secured from pig-keeping is to vary one's stock of pigs as little as possible in times of good or bad trade. Those losses which are inseparable from the sale and purchase of one's breeding stock are avoided, and advantage can at once be taken of any rise in value, whilst actual loss can be prevented in times of low prices if the owner employs adequate care and common sense in the management. This last system is undoubtedly the least speculative, and pig-keepers generally are not favourably situated for the acquisition of knowledge as to the probable trend of the markets; still, there is a great temptation and at least a sporting chance of making money by increasing one's stock of breeders when the rebound in prices appears to be certain. Each extra sow kept for a year or a year and a half when pigs are at famine price is certain to leave a considerable profit, providing she and her produce be sold ere the slump in prices has set in.

THE SOW AND YOUNG PIGS

One of the frequent causes of a want of complete success in the breeding of pigs is neglect in the choice of sows intended to be kept for breeding purposes. In many districts it is a general practice to reserve for brood sows the smallest and most inferior female pig of the litter, or the one which is variously termed the dilling, the pitman, the Harry, the wreckling, &c. The frequently-alleged reason for this is that this less well-developed pig invariably makes the best breeder and mother. When an effort is made to discover the grounds for this assertion, or belief, little if any satisfaction is to be obtained, the principal reason being a belief in the truth of the contention which receives the support of so large a proportion of the pig-breeding fraternity. It is quite

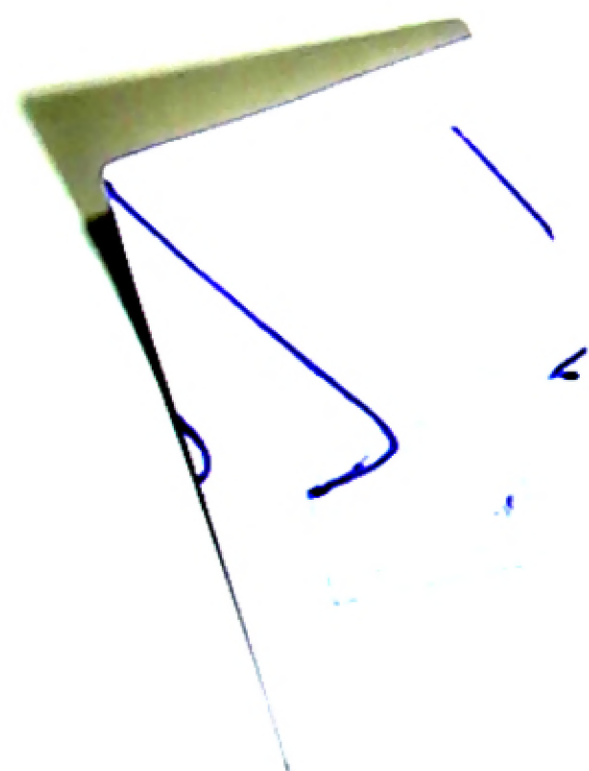
possible that this fancy in the superiority of the less well-developed offspring of the sow may have originated and received support from the fact that the initial cost or value is so much less than would be the cost of the best female pig of the litter if purchased or reserved for the purpose. There are cases where the pig which is the smallest of the litter at the time of weaning will prove to be equally as well suited for reservation for a brood sow as would the largest gilt of the litter, since the smallest pig may happen to have taken to itself, during the first few hours after it was farrowed, a teat which supplied less than the average amount of milk furnished by the other teats. This deficiency in the supply of milk is very common, if not general, when the teat is of a smaller size than ordinary; but it sometimes happens that through injury or other cause one or more of the teats will not provide an average quantity of milk. Another alleged cause for this want of development is the fact that the under-sized pigs have had allotted to them, or have taken of their own free will to the hindmost teats of the sow's udder, which are considered to furnish less, if not inferior, milk than is furnished by the teats placed nearest to the fore legs. There is a belief which appears to have some foundation, that those pigs which suck these teats obtain a greater share of the sow's milk than do those which suck the hindmost teats. It is doubtless a fact that in the majority of cases when the sow has more teats than pigs, the hindmost teats are those which are most frequently neglected. The less-plentiful supply in these teats may be due to the fact that almost invariably the young sow with her first litter does not rear as many pigs as she has dills, consequently the hindmost ones are not utilized, and, owing to the mere fact that these are not used for the continued secretion of milk, they do not appear to develop to the same extent. At all events, those teats which are sucked during the rearing of the first litter secrete a greater amount of milk subsequently than do those teats which have not previously been utilized. This is declared to be a point in favour of allowing the young sow to rear as many pigs as is possible. It is quite feasible to prevent any great amount of harm following, provided that ordinary care is taken by the man who feeds her. Naturally, the young sow suckling ten pigs will require a greater quantity of food than one with only six pigs on her. This would be admitted by everyone, but the difficulty generally arises from the delay in putting into practice an admittedly needed system. So many pig men fail to anticipate trouble. In far too many cases this extra food is withheld until the shrunken and

weakly condition of the young and free-milking sow cannot be overlooked, or until she becomes partially paralysed, as too frequently happens when a sow which furnishes a large and continuous supply of rich milk is not fed in accordance with her natural requirements. The old-fashioned idea that a farrowing sow should have little, if any, food for at least two days after farrowing has given way to the more sensible plan of giving her a sufficiency of easily-digested food, so that she can quickly regain her strength after the perils and pains of producing a family, but also that she may be in a fit condition to commence the manufacture of milk on a scale commensurate with the requirements of her family. In the olden times the fear was prevalent that if the sow, or any female, was not put on to almost starvation diet for a few days after the birth of its young there was great danger of that which is termed milk fever. Modern views are that the giving birth to a family is nothing more than a natural episode in the life of a female, and that the more nearly we adapt our mode of procedure at the time of increase to nature's requirements the more successful will be our efforts. In a natural state the wild animal does not gorge itself with an abundance of food just prior nor immediately after it has given birth to its family, but it does take a sufficiency of food to enable it to furnish a good supply of milk to its offspring. So it should be with the sow, the food given to it during the latter part of its pregnancy should be somewhat limited in quantity, but should be good in quality and easily digested. If this system were generally adopted we should hear far less frequently of the unfortunate occurrences which lead to the slaughter of the sow and the death of the litter. Similar care, and the adoption of the same plan, will be found to be beneficial with the sow which has recently farrowed.

THE TYPE OF SOW

It will be advisable, before giving consideration to the various systems of management of the brood sow and her family, to endeavour to give a description of the points of that sow which is most likely to prove a success. At all times the length of the body of the sow was thought to be an important point, since a good brood sow will frequently rear twelve and even fourteen pigs, and these, as they grow older, require a considerable amount of room in which to lie when sucking the sow. It will therefore be necessary for the sow to be long in the barrel in order that her udder may be of sufficient length to accommodate the struggling mass of young pig life when it is endeavouring to satisfy those

pangs of hunger which appear to be inseparable from a healthy and vigorous pigling. In addition, it is necessary for the sow to possess a long body since the present demand is especially keen for sides of bacon which possess a large proportion of middle. So unduly great is the demand for this particular portion of a flitch of bacon that the price of the middle is often twice as high as that of a portion of the fore quarter, and considerably greater than that asked for the hinder portion, including the gammon, &c. We have thus two most important reasons for selecting a sow which has a long body. We also have two equally good and valid reasons for choosing a sow which is light in the fore quarters. Such a sow is almost invariably a far better mother in every way than a sow which is wide and heavy in the shoulders. The sow with a light neck and fore end is generally more prolific and furnishes a larger supply of milk for a much longer time. This last is very essential, as pig breeders are at last awakening to the fact that early weaning of young pigs is a mistake in many ways. The sow's head should be of fair length, light in the jowls, wide between the ears, which should be long in proportion to the body, but not thick or coarse. The width of head is, as in human beings, an indication of brains and constitution—two essentials in the life of a biped and of a quadruped. The jowls or cheeks should be light, as the value of these for food purposes is small, whilst a very heavy jowl is almost always an indication of an excess of fat in the carcass. The hind quarters should be long and square, since the shape of the ham has an effect on its value when cured, whilst a sow with well-developed hind quarters is almost invariably better qualified to carry out the duties of motherhood than one less well formed. The ribs should be well sprung, yet deep, whilst the chest should be wide, so that there rests a sufficiency of room for the free working of the respiratory and other organs. The flank should be well let down and thick, as this last is a sure indication of the proportion of lean meat in the body generally. This appears to be more especially desirable in the case of pigs intended for the manufacture of bacon. One of the great difficulties in the path of the bacon curer is the pig with a thin flank, as it renders the side of bacon of considerably less value than one manufactured from a pig with a thick flank. The legs should be set well apart, straight, and possess bone of fine quality, as round porous bone is invariably associated with meat of inferior quality. Round joints and loosely-knit, open feet should be avoided, as these indicate absence of quality of flesh, and are frequently the cause of trouble both to the sow at grass



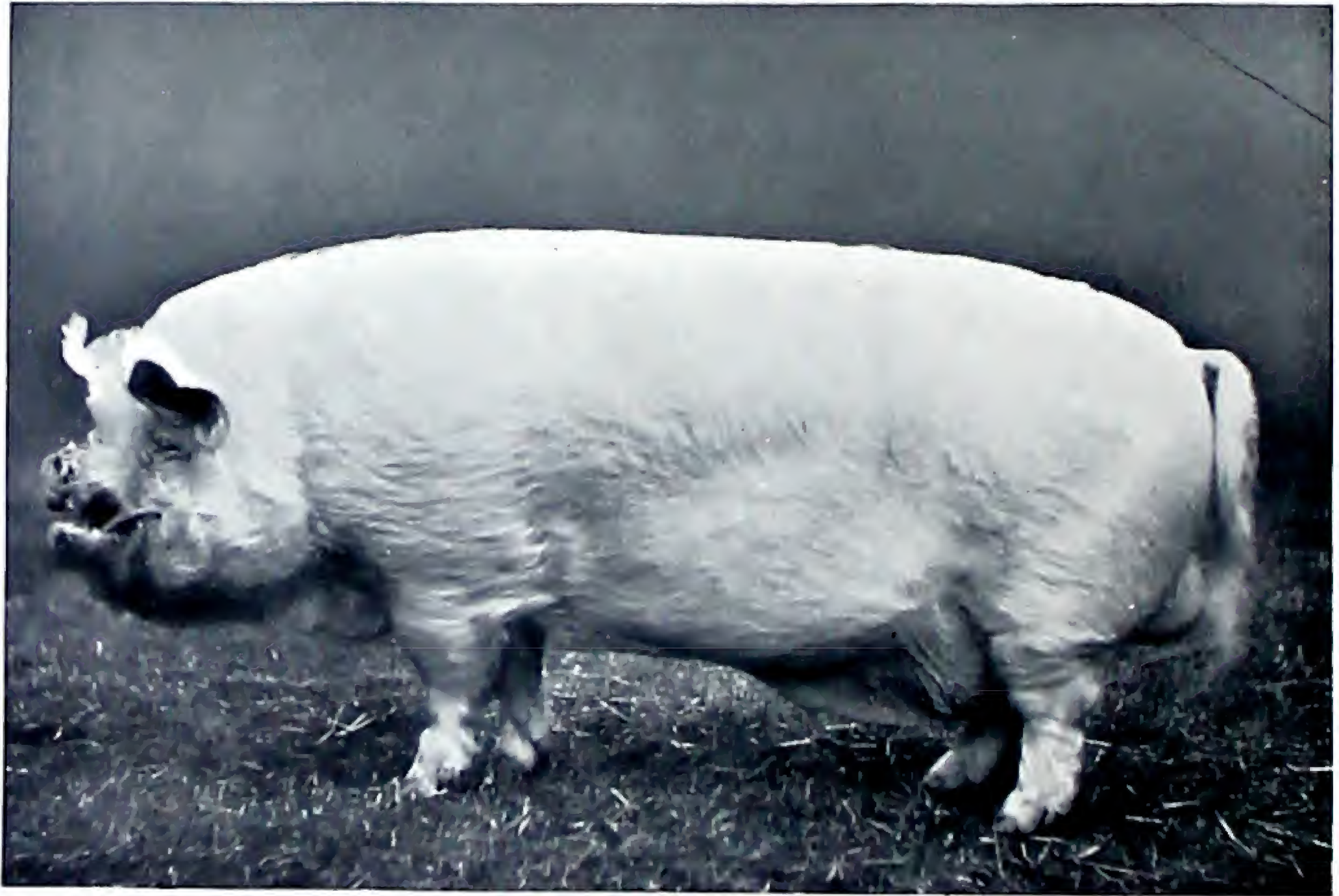


Photo. Parsons

MIDDLE WHITE BOAR—"BANKER OF CASTLECROFT"



Photo. Parsons

MIDDLE WHITE SOW—"HOLYWELL PERFECTION"

and to the fat pig when on its way by road or rail to be slaughtered. The hair should be plenteous, straight, and fine in texture, and the skin firm but not thick, as pigs possessed of these particular points are little if at all liable to be scorched by the sun. In some districts considerable trouble is experienced from the dryness of the air and the heat of the sun's rays. Pigs with coarse bone, round joints, soft skin, and coarse or curly hair, whether of a white or other colour, are greatly affected with what is commonly termed blistering. It is true that the pig of a white colour more promptly shows the effects of the scorching, but pigs having black hair and skin are not free from the same trouble unless the hair, skin, and bone are of the proper quality. The most important point, probably, in the brood sow, the udder, is left last to be described. There seems to be really good and sufficient reasons for the belief held by many practical men that the number of teats possessed by a sow is a very fair indication of her prolificacy and of her milking capabilities. It is also held that the sow whose udder commences as closely as possible to the fore legs is also bound to possess those qualities in a marked degree. In support of this belief, attention might be called to the fact that the wild sow, which produces some six or seven pigs at a litter, and rears even only a portion of these, possesses but few teats, and these commence some distance from the fore legs. It is inadvisable to reserve a sow for breeding purposes unless it possesses at least twelve—fourteen are better—evenly-shaped and equidistant teats of good formation. Teats of a size less than the average are frequently placed so closely to the adjoining ones that there is not sufficient room for the pig to suck them conveniently when it becomes two or three weeks old, but generally before that time has arrived the pig which has taken this particular teat for its very own will have become very weak, if it has not already died of starvation, owing to the very small quantity of milk furnished by the immature teat. Another trouble which is somewhat common in certain breeds of pigs is what is termed a blind teat. It is one in which the nipple does not stand prominently forward, so that the tongue of the little pig cannot grasp it. When the pig makes the attempt, the teat simply recedes to such an extent that the pig is unable to extract the milk. This blemish, like unevenly-placed and small teats, is declared to be hereditary, descending both from sire and dam. Another and very important point in the brood sow is a quiet disposition and good temper. It is useless for the sow to farrow a large litter of pigs, and to be qualified in every other way to rear them properly,

if she possesses a bad temper and is irritable in the sty. Loss of life and injury to limb frequently result from the irritability of the sow. Many of the losses from pigs being overlaid soon after birth are due to this failing, which shows itself also during the short life of the fattening pig. One nervous, irritable pig amongst a number of pigs which are being fattened is a frequent source of loss. It seems to be always alert to the slightest change in the vicinity of the sty, and it at once gives to the others, by emitting a kind of bark, a warning, when most of them will rise to their feet and follow the disturber of the peace to the door of the sty for the purpose of investigating the cause of the disturbance. In this way food and its equivalent energy are both wasted. There is an old couplet which roughly but surely describes the whole duty of a fattening and thriving pig—

“To eat, drink, sleep. What then?
To eat, drink, and sleep again.”

A lot of pigs in which one or two are of the restless, irritable type, which are descended from one or both bad-tempered parents, are placed at a great disadvantage when endeavouring to live up to this refrain, and the average loss from restlessness on the part of one or more of the pigs is more considerable than is often realized by the average pig-feeder. One of the best of this class, which in my good fortune I met in early life, declared that the pigs which made the greatest increase on the proportionately-smallest amount of food were those which most promptly lay down to rest after feeding, and there lay until feeding time again came round. He considered this to be almost as sure a guide as to the thrift of the pigs as the scales, although he also persisted in weighing each pig which was being fattened at least once a fortnight. Another point which he particularly noticed was the state of the droppings of the fattening pigs, as from their appearance and consistency he could, he contended, form a correct opinion as to the state of health and well-being of his pigs. It is quite probable that the old man had in his youth been employed as a shepherd or as page to a shepherd, and had not forgotten how good a guide as to the health of his charges was revealed by the inspection of the dung of the sheep in the fold where the sheep had rested during the preceding night.

Beyond and in addition to these disabilities attending the fattening pig which has inherited nervousness or irritability, there is frequently danger to the attendant on a bad-tempered sow whilst endeavouring to assist her in a difficult case of parturition. The attempt to help is also rendered less likely to be successful.

whilst the probability of injury to the newly-born pigs from the sudden and frequent uprising of the sow from her nest are very considerable. The sow may in its uneasiness merely tread on the foot or leg of one of the little pigs, when it will shriek and thus materially add to the excitement of the sow that she becomes almost distraught, and serious trouble is almost certain to follow.

FIRST MATING

As on many other details connected with the management of pigs, there is a diversity of opinion amongst practical men as to the age at which the young sow should be first mated. Very probably these different views are the result of keeping different breeds of pigs, or of variations in the systems of rearing and feeding not only the budding sow, but the sow when she is rearing her first litter of pigs. The age prescribed for a female pig to be mated with the boar varies from six to twelve months. Our experience, extending over more than half a century, leads us to suggest that if the young sow has been fairly well reared, and if the probable time of year of her farrowing be suitable, then she may be served when she is eight months old. We are also assuming that she be properly fed both before and after farrowing, so that she is able to produce a strong litter of pigs and also furnish them with a sufficiency of milk to enable them to grow up strong and lusty. As to the portion of the year in which it is best for a young sow to farrow, the early part of March is as good, and perhaps better, than any other period, as the pigs will naturally thrive best in spring, and the sow will regain her strength and complete her growth better in the summer than during the winter months.

There is a marked difference in the prolificacy of sows, as there is also in their capacity to produce a quantity of rich milk extending over a period of at least eight weeks. Only those sows which are descended from dams especially good in both these respects should be reserved for brood sows; then the question as to the number of pigs left on each sow will not be of such great importance. By this we would not have the reader infer that it is advisable in all cases to leave on the sow the whole of a large litter which she may produce. Probably a matured and judiciously-fed sow will have no trouble in rearing as many as twelve pigs. The exact number which should be allowed to remain on the sow with her first litter is doubtful. Some pig men prefer to leave a comparatively small number on the sow, in order that the latter should

have a better chance of completing her development, whilst other and equally-experienced pig-keepers contend that a young sow on which is left a goodly number, even as many as ten pigs, generally proves to be a better mother than the sow which has reared only five or six pigs at her first trip. Two of the ill effects of allowing a young sow to rear a large litter of pigs are the loss of flesh and the check to the growth and development of the dam. These troubles certainly follow unless extra care be taken in the feeding of the sow, and in getting the young pigs to eat at as early an age as is consistent with safety, say, when they are about three weeks old. Amongst the best of foods both for the sow and her pigs is separated milk, or other dairy offals in which there is no great amount of salt, as there used to be in buttermilk under the old-fashioned system of butter-making. The bodily condition of the sow at the time of farrowing should also be considered when a decision is being formed as to the number of pigs which she is to be allowed to rear. The mistake is frequently made of allowing brood sows to become comparatively low in condition ere they farrow. The idea that good and sufficient food gives a better return after the sow has farrowed than previously is a grievous error. A sow which has been insufficiently fed during the later portion of her pregnancy is far less likely to produce a good flow of rich and healthy milk for her pigs than one which has been well and judiciously fed. It is not necessary, nor is it desirable, that sows with their second and subsequent litters should be laden with fat, as this is not conducive to milk-yielding nor the building up of healthy and vigorous youngsters, but the sow should be in a strong and vigorous condition, the result of suitable food and exercise. The young sow with her first may, and indeed should, be in better flesh, since the act of parturition and the furnishing of milk for her youngsters is a novelty to her and therefore affects her more, whilst in addition to the cares of motherhood she has to build up her own frame.

Another mistake frequently made by novices is feeding the brood sows during the latter part of their time on bulky and comparatively innutritious foods. When it is considered that newly-weaned pigs weigh from $1\frac{1}{2}$ to 3 lb., according to the breed, age, and condition of the sow, it can be readily understood that a sow producing a dozen or more pigs should be supplied with that kind of food which will enable her to produce healthy pigs in lusty condition with the least loss of flesh or condition to herself. It is well to limit the bulk of the sow's food during the two or three days prior to her becoming due to farrow, as the operation is much more

easily carried out when the sow's bowels are not distended with food. This result can be easily attained by forcing the sow to take walking exercise during at least a quarter of an hour each day. It is very seldom that a sow which has taken, or has been compelled to take, a sufficiency of exercise has any difficulty in farrowing, and further, should any trouble arise, the sow much more readily recovers than does the sow which has been kept confined and has not been exercised.

FARROWING

The signs of farrowing are the enlargement of the vulva and of the udder, whilst an almost certain indication of a litter arriving within twelve hours is the presence of milk in the udder. Each sow should have the sty allotted to her in which she is to farrow for at least ten days prior to her time. It is a moot point whether or not the pig-man should be present at the time of farrowing. It may not be in the least necessary during the summer months, when there is no risk of the newly-born pig becoming chilled unless it finds its way to the teat very quickly after it is ejected. Still, the presence of the pig-man very frequently prevents the loss of a pig from various causes, and he can often give the sow a little assistance which will prevent trouble, as well as guide the pigs to the teat, and stay those family quarrels over the possession of a teat, which sometimes result in the udder of the sow being bitten, which may cause the sow to jump up hastily, and then perhaps to lie on one or more of the little pigs. Young and vigorous sows frequently carry their pigs beyond the customary one hundred and twelve days, when the teeth, with which the piglings are furnished ere they are born in order to assist them to grasp the teat, become of abnormal length and very sharp. Then in the skirmishes which always take place ere each pig settles down to its own selected teat, the teats or the udder are pierced by the sharp-pointed teeth, and if this continues for any length of time the sow will turn on to her belly and refuse to allow the pigs to suck. This result is bad for both mother and children, as the collected milk which the pigs ardently desire will promptly set up a state of inflammation in the udder. The difficulty can be overcome by placing the pigs in a hamper or box and conveying them out of hearing of the sow, when each pigling is in turn placed under the left arm and the teeth broken off by the aid of a small pair of pincers. The operation is almost if not quite painless, and should be in every case a successful one. The sow may, when the pigs are replaced with her, still

refuse to suckle them, but by scratching or rubbing her side or udder, the pig-man will promptly succeed in getting the sow to lie on her side, and the pigs, being hungry, will quickly relieve the udder. Many persons with a fondness for cleanliness are in the habit of removing the sow's nest, or the litter which has become sodden, and replacing it with dry straw. This is apparently commendable from a sanitary point of view, but in practice it is proved to be a mistake, since in the remaking of her nest with the fresh straw the sow often envelops one or more of the little pigs, which are unable to free themselves when the sow lies down, and they become smothered. The better plan is to furnish the sow with a little slop (made warm in winter), and whilst she is consuming this, to carefully remove the afterbirth, and also spread a little dry but short straw over the nest, so that the pigs have a dry bed, and then when next the sow is fed the following morning remove the whole of the soiled straw. The sow should then be turned out of the sty for a few minutes until she has relieved her bowels and bladder. Should she have any trouble she should be exercised, when the desired result quickly follows. It is a moot point with pig-men as to whether or not it is necessary to give the newly-farrowed sow medicine. There appears to be no good and sufficient reason for this in ordinary cases; but when the farrowing has been prolonged by the wrong presentation of a portion of the litter, and especially when assistance has had to be rendered, a dose of aperient medicine will be necessary. A comparatively small dose should first be given, or the little pigs may suffer from too great looseness of the bowels. Frequent exercise for a short time will generally have the desired effect on the bowels and prove of great benefit to the sow.

DIET FOR THE SOW

Feeding the sow twice per day should be sufficient during the first ten days after the birth of the pigs. Should the number of pigs be large, and the supply of milk appear to be insufficient, a light meal in the middle of the day, consisting of old beans, or the ordinary food, may often be given with benefit to both the sow and her pigs. Some pig-men are in the habit of feeding the newly-farrowed sow mainly on broad bran for several days for the purpose, they declare, of avoiding bowel and milk troubles. The bran certainly acts as a laxative, and this may very occasionally be required, but a sole diet of bran cannot be good for the sow, nor does it ensure a supply of milk for the piglings. It will be quite sufficient should the food for the first day consist of one-third part bran,

the other two parts being sharps, or the finer portion of the offals in the production of wheaten flour. This feeding-stuff goes by different names, such as hogsmeal, middlings, shorts, randan, dan, &c., in various parts of the country. It is without doubt the best food for sows with pigs until the latter are about four weeks old, as well as for newly-weaned pigs. Bran is not a suitable nor an economical food for pigs. In the first place it is swallowed whole; it contains a large proportion of fibre, and the pigs are unable to digest it thoroughly enough to extract from it the feeding qualities it possesses. In addition to this it irritates the bowels of pigs, especially of young ones, and causes them to evacuate their bowels ere the whole of the nutrition of the food has been extracted.

EXERCISE

It is advisable to allow the suckling sow to take a little exercise each morning while the sty is being swept out; it is beneficial to the sow, and tends towards the sweetness of the sty. When the pigs are about three weeks old, it is a good plan to give the sow a run in a paddock, or even in a yard or any other place, for an hour or two during the morning, and during her absence to place in a low trough in the sty a few kernels of wheat or a little sweet milk. The youngsters' natural inquisitiveness will cause them to examine the troughs, and very quickly extend their inspection to the contents of the same. Any of the food left over will be readily eaten by the sow on her return to the sty, so that the remainder will not be left a sufficiently long time to become sour. If this did happen, the pigs might suffer from diarrhœa, an ailment to which young pigs are prone when they first begin to eat, at about the age of three or four weeks. The object of the pig-man should be to encourage this feeding of the little pigs, as their so doing reduces the drain on the sow, and greatly assists the development of the youngsters. A small and gradually-increasing quantity of wheat, maize, or barley meal may be added to the sharps when the piglings are some five weeks old. The absence of the sow from the pigs may be extended to the afternoon as well as morning, and the time lengthened until, when the pigs are from eight to ten weeks old, the sow's milk will have gradually dried up, and the pigs will feed so well that they will have become independent of the milk from their dam.

MATING

As a rule, the sow will come into heat within a few days after the pigs have been weaned. It is better to have her mated some two or three days after the inflammatory condition of the vulva is noticed, as she is then much more likely to conceive. Should the sow be baulked, difficulty sometimes arises, and there is often one or more returns to the boar. One complete service is likely to prove as effective as several matings. After the sow has been mated she should be kept apart from the other sows until the period of œstrum has passed. In case the sow does not hold to the service, a return is usual within three weeks.

BREEDING FROM FIRST LITTERS

For some reason or reasons not on the surface, there exists amongst old-fashioned pig-keepers a strong prejudice against saving the females from a sow's first litter for breeding purposes. This objection does not seem to be so strong against the use of a male pig. It is true that the young of a gilt are frequently not quite so well grown as are the produce of a matured sow when first weaned; but this is due to the shorter supply of milk furnished by the young and immature sow. The inferiority in development becomes less noticeable as the pigs grow, until at the time when they are completely furnished it is impossible to distinguish them from the pigs produced by the mature sow. So far as our experience has enabled us to form an opinion as to the advisability, or otherwise, of selecting for breeding purposes the produce of first litters, we confidently assert that there is nothing in the objection. Our practice was to reserve for our own herd, or for exhibition purposes, the best-formed and best-developed male or female pigs from the favourite sows, whether these had had one or a dozen litters. Quite a fair proportion of the most successful breeding and exhibition pigs were bred by young sows at their first attempt at motherhood.

CASTRATING AND SPAYING

With regard to the age of the young pigs at which it is best that they should be castrated or spayed there is a variety of opinion; some practical men are in favour of having these operations performed when the pigs are about six weeks old, whilst others prefer that the pigs should be seven or eight weeks. There may be less risk at the younger age; any way, it is advisable that

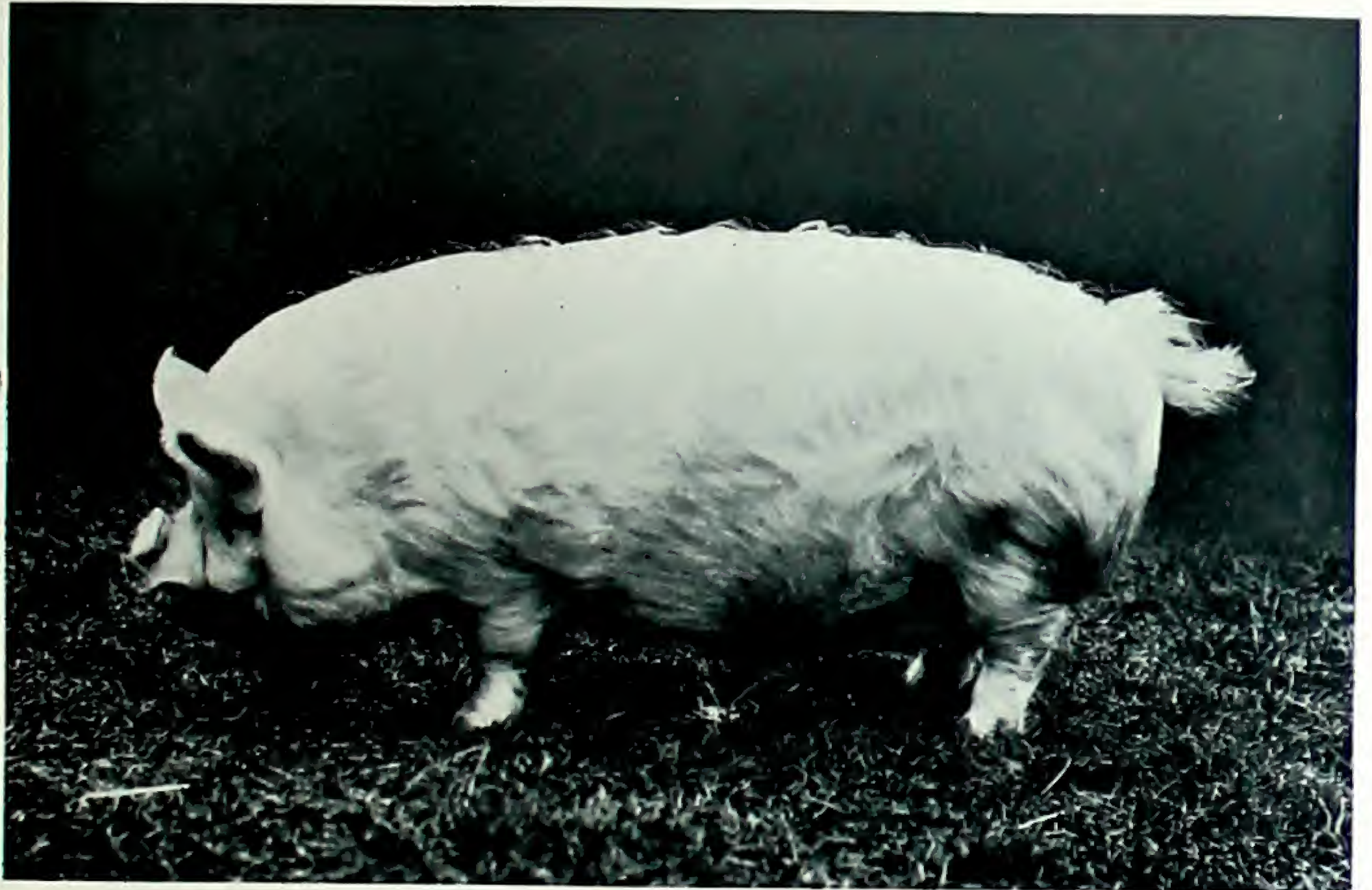


Photo. Babbage

SMALL WHITE BOAR—"WALTON PIPPIN"



Photo. Sport and General

SMALL WHITE SOW



the pigs should have recovered from the operation ere they are weaned from the sow. In many parts of the country the operation of spaying the female pigs has become most uncommon. Various reasons are given for this, amongst others the difficulty of finding one of the old-fashioned castrators who used to travel the country. Another cause is the general belief that, as so many of the pigs are now fattened and killed before they are eight months old, the supposed loss during the period of œstrum must of necessity be small, even if any loss is sustained. The opinion used to be common amongst the old order of pig men that a certain amount of time, if not of food, was wasted by the unspayed female pig; and further, that if the pig was killed when in a state of heat, the meat would not properly take the salt, and that even if the meat were cured, a dark-coloured deposit would be found in the mammary glands. The bacon curers appeared to think that this trouble, which they termed "seedy bellies", was due to the inflammatory state of the milk glands. These so-called seedy bellies are a very considerable source of loss to bacon curers, who have endeavoured to convince pig breeders that unspayed female fat pigs are unprofitable to both owners and curers.

Doubt has recently been cast on both these assertions—the loss during the heat of the unspayed sow pigs and the cause of the "seedy bellies". During the past two or three years most careful experiments have been carried on at Cambridge by Professor Marshall and Mr. Kenneth Mackenzie, which are said to prove that an unspayed pig will give an equal return from a certain quantity of food as will a pig which has been operated upon. Further, that the "seedy bellies" are not due to the pig having been killed when in a state of heat, but that they are a result of an excess of pigment in pigs of a black colour. It may not be possible at present to write with any great amount of confidence as to the actual cause of this discoloration of a portion of the side of bacon; but there is little doubt that the removal of the cause would mean a saving of many thousands of pounds annually to the bacon curers in the British Isles.

THE BOAR

Whether the cause be mistaken ideas of economy, of want of thought and care, or a deficiency of practical knowledge, there is far too frequently a mistake made in the selection of the boar with which to mate his sow by the ordinary pig-keeper. This last must be one of the main reasons for the wretchedly low standard of merit of a large proportion of the stock boars kept for public service

in many parts of the country. Parsimony is often carried to an extreme by occupiers of cottages or small-holders, the idea being that anything saved must be something gained, and if the use of a boar can be obtained at a fee of 1s., there must be a saving of 1s. 6d., as compared with the fee of 2s. 6d. payable to the owner of a boar in every way superior. A moment's thought would have convinced the saving owner that the difference in the cost of begetting each pig reared amounted to only 2d., whilst the increased value of each pig sired by the good boar would probably be nearer 2s. than 2d. This carelessness may be due to the fact that pig-keepers fail to realize that the majority of pigs take far more in form after their sire than after their dam, and especially is this the case where the boar has been bred for several generations on defined lines. A pure-bred boar from a herd which is mainly self-containing, and managed by a thoroughly practical man, with a view to producing commercial, not mere prize-winning, pigs, is certain to impress its likeness and form upon its produce, especially when the sow is of mixed or cross breeding. It is advisable that of the two parents the boar at least should be of good form and character. The term pure-bred has not been used, since the conditions of entry into many of the herd books are that the animal entered shall have had parents which in turn have had a record of the breeding of their progenitors entered in the stock register of the particular breed. A very large proportion of the so-called pure-bred animals are as much a mixture of blood as are many of the ordinary animals of the same breed, and to this cause, amongst others, must be attributed a certain amount of objection which is heard against the use of so-called pedigree sires. Pedigree, not good points fixed by generations of breeding on similar lines, is too frequently sought after by novices and unpractical men.

POINTS OF A GOOD BOAR

The value of a really good boar is almost beyond conception. What, then, goes to constitute such a boar? We have touched on breeding, what of form and character? It is imperative that his character, so far as disposition is concerned, should be good. A bad-tempered boar is an unmitigated nuisance on a place. It is a danger to every person and animal with which it comes in contact, and it is wellnigh certain to transmit its bad temper to its produce, since few weaknesses are more hereditary. The head of the boar should show masculinity; it should be of fair length, wide between the eyes—these last should be mild and gentle in expres-

sion; the ears should be slightly inclined forward and free from coarseness; a boar with short and erect or prick ears is generally more alert, if not restless. The neck should be muscular; the shoulders neat and compact, not open at the top nor prominent at their points; the muscles of the back and loin should be well developed; the ribs well sprung; flanks both fore and aft muscular; the hind quarters long and deep; the legs placed well apart; the legs short, with neat, hard bone; the skin fine, and the hair straight, plentiful, and free from coarseness. It is well that the boar should be neatly and compactly built rather than be of extreme size and ungainly. Boars of the latter type are not nearly so productive, nor do they, as a rule, continue to be fruitful for so long a period. A boar possessing quality, compactness with masculinity, even though he appear to be somewhat small, will generally beget some of the finest specimens of the breed, provided he be mated with sows built on a generous scale.

A boar pig becomes fruitful at about the age of six months, or before, should his diet have been liberal; but it is not advisable to mate him with young sows until he is eight months old, and then only occasionally. Many boars are rendered wholly or partially sterile by too frequent use before they are completely developed; whilst the chief cause of small litters is allowing too frequent services on the part of the boar—not, as a rule, from too large a number of sows being put to him, but from allowing the sows to remain over a length of time in his pen. The boar's sty should permit of the sow in heat being turned in, and as soon as she has been served once she should be removed.

An idea appears to be prevalent amongst pig breeders in some districts that an aged boar should on no account be mated with a young sow. We have hitherto failed to discover any good and sufficient reason for this opinion. Our own experience leads us to believe that, providing the young sow is strong and large enough to bear the boar, she is more likely to become in pig, and to produce equally as vigorous, if not more vigorous, pigs than when mated with a boar of her own age. We are convinced that a very large proportion of the males of our various pure breeds of animals are sent to the butcher long before they are due at the shambles, and when there are long periods of usefulness before them. Not only so, but many males are sacrificed ere their great value at the stud can possibly be realized. Amongst our greatest improvers and breeders of live stock have been those whose system was to give the males which they used a trial with a very limited number of females; then if the result was favourable, the successful

sire was continued in use so long as he was fruitful or possible, without too close inbreeding. Some of our most successful boars have continued fruitful until they were at least ten years old, and some of their best produce have been begotten in the comparatively old age of their sire.

The boar should be so fed that he is in a strong, vigorous condition. This does not necessarily mean that he should be high in condition, or fat, as this is more likely than not to impair his usefulness, whilst it is certain to lessen the chances of his being available on account of his excessive weight.

The place in which he is kept should be roomy, so that the sow can be turned into it. An open shed, with a yard attached, and facing the south, is most suitable, especially if a portion of the shed can be enclosed in the winter months.

It cannot be too strongly impressed upon those who have charge of a stock boar that, with kindness, firmness, and due care, it is possible to do anything with him, but that ill treatment is certain to result in a vast amount of trouble, if not in personal injury, to anyone who loses his temper and ceases to act with reason and common sense.

STORE PIGS

The term store as applied to pigs has varying meanings applied to it in different districts. In some parts of the country a boar pig which is intended for service is called a store pig. But the term is more generally applied to pigs which are being kept in a growing condition, the store stage being a kind of interregnum between the sucking and the fattening stages.

The necessity for this intermediate or store stage has well-nigh passed away, owing to the great changes in the taste of the public for pork of a totally dissimilar character to that in demand only a comparatively few years since. At the present time consumers require small joints of meat from comparatively young animals. These requirements cannot be met when the old-fashioned system of allowing pigs to run about during the greater part of a year as store pigs is followed. Besides that, it would be most difficult to convince an enlightened pig-keeper that the system in vogue in the time of our fathers of having a store and a fattening stage in the life of a pig was, under present conditions, a profitable one, or one founded on true commercial principles. Even those male and female pigs which are left in a state of nature are now much more sensibly kept during the transition period when they are separated from their dam until they are





Photo. Sport and General

TAMWORTH BOAR



Photo. Babbage

TAMWORTH SOW—"WHITACRE GRACE"

called upon to take up the serious duties of life. Their store period of life is shortened by food of a more nutritious character and in greater supply. In this way is their day of maturity hastened and time and food saved.

There may still be some persons who believe in the necessity for pigs being kept in a store condition, in order that the pigs when fattened shall be of that large size and weight which are still demanded in a few portions of the country where extremely heavy work is the lot of people who are employed in manual labour. But even under these conditions it will be found advisable to give to the store pigs some food of a better kind, in addition to grass, roots, &c., so that the pigs will both grow and lay on flesh at the same time. The owners may, and most probably will, be deprived of that which was said to be the great pleasure of our forbears, viz. the almost marvellous improvement in the appearance of the old-fashioned store pig of about a year old when put up to fatten. The object to-day should be to produce the finest quality of pork in the shortest possible time consistent with economy. The most successful man will be the one whose pigs are not for any length of time "store pigs".

PIGSTIES

These have been described more or less correctly as of three kinds—those which are ornamental, those which are useful, and those which are neither the one nor the other. Unfortunately, not only for the poor unfortunate pigs whose ill fortune it is to be compelled to exist in sties which should come in the last-named category, but also for their owners, the want of comfort, and frequently of shelter, is the result of carelessness or of the non-employment of that little amount of care which frequently determines the question of success or failure.

It is not that the requirements of pigs are of so drastic a nature. Probably the results would be more favourable if the demands were of a more comprehensive or severe character, as under those conditions ordinary care would be imperative. The chief points to be considered when building a pigsty are that it should protect the pig from rain, heat, and draughts, and at the same time be airy. Of course, in the very coldest weather, such as we experience once or twice in a decade, it will be necessary to give consideration to the question of heat; but under ordinary conditions, if the pigs of over three or four months have a plentiful supply of food, a dry bed, and plenty of fresh air, they will be as happy and con-

tented as the proverbial king. They are then in a condition entirely consonant with their nature. In the winter, young pigs require somewhat warmer conditions in order that they may make good and profitable growth. Still, it is surprising how well even young pigs will thrive under conditions of some exposure, provided that their bed is dry and their house or shed open only to the south. There is little doubt that one of the chief failings of so many of those expensive piggeries which are to be found on many home or fancy farms is the want of proper and thorough ventilation. An inadequate supply of fresh air is commonly evidenced by the listlessness of the young pigs, dullness of the coat and skin, a general appearance of lassitude, and absence of desire to move about, as is natural to young animals of all kinds.

There exists a considerable difference of opinion amongst pig-keepers as to the best form of piggery. The most general kind is a house low in the walls, a permanent opening in the front wall through which the pigs can at all times pass to an open and enclosed yard of about the same area, some 8 to 9 ft. square. The advantages claimed for this kind of sty is that it is inexpensive; that it is warm; that it is sweet, since the pig will proceed to the outer court or yard at all times to relieve its bowels or bladder; that the bed is not subject to the risks of becoming wet from the close proximity of the feeding-trough, since this is always kept in the outer yard; if loose or fixed in the wall, having a hanging door which can be forced inwards and secured whilst the food is being placed in the trough, and then secured at the front of the sty so that the pig can eat its food. At the same time, the hanging door prevents the pig gaining its liberty by squeezing through the opening.

The claim for cheapness is at least a problematical one. A sty of this character is close and stuffy in hot weather owing to the low roof, whilst in cold weather it is always draughty, on account of the opening which gives liberty of entrance to the pig. Evidence of this uncomfortable condition is generally afforded by the occupier making its nest, not on the higher portion of the floor and to the back of the sty, where one would naturally expect it, but in the lower corner next to the opening, as the pig objects less to the cold than to the draught. Of the two evils it very wisely chooses the lesser. Other objections are the difficulty of cleaning out the sty, and the impossibility of inspecting the occupants save by enticing them into the open yard and so disturbing them, with the inevitable result, a wastage of food.

Some persons hold in favour the system of having a double row

of sties under one roof. A passage down the centre is reserved, which gives entrance to each sty and allows the food to be carried to the pigs and the manure carted away. The outlay on such a building must necessarily be large and the ventilation somewhat difficult. It is by no means easy to combine freedom from draught with a plentiful supply of fresh air. Another objection is the absence from the sties of the mid-day sun unless the building runs from east to west, when the sties on one side of the house will be very much warmer than those on the other. These last will suffer greatly from having a northern aspect. Should the building be placed north and south, then one side will benefit from the rising and the other from the setting sun, whilst the advantage from the sun in the middle of the day will be lost.

Probably the system which gives the best results is that of a row of houses rather than sties running from east to west. The front wall should be 6 ft. 6 in. high, whilst the back will be so much higher as to give sufficient fall to the roof. The houses should be 11 ft. from front to rear and 10 ft. wide. The doors should be divided so that the upper portion can be left open during the day and, if necessary, occasionally closed by night. The partitions between the houses may be about 4 ft. high. Ventilation should be given both before and behind. The walls may be composed of feather-edged boards on a framework, the foundations being brickwork some 9 in. above the ground. There should be an open drain outside the front of the houses to carry off the moisture.

The floors of piggeries are composed of several materials, such as earth or rammed chalk, wood, flags, concrete, asphalt, bricks set in concrete, bricks laid on sand, &c. Ordinary bricks laid on sand are said to make the best floor for young pigs. It is said to be warmer than the floors made of any other material than wood, but this last is objected to on account of its absorbing the moisture and becoming unpleasant if not unhealthy. Asphalt is said to be cold, as in a lesser degree is concrete. The difficulty with earthen or chalk floors is to prevent the pigs rooting them up. One of the advantages of a floor easily taken up and replaced is that rats, which so frequently thrive where pigs are kept, can be turned out of their runs under the floor. There should be a slight fall to the front of the sty, and an opening made so that the moisture is allowed to escape into the open drain outside the building. An open drain is not exactly an ornament, but with a little care it can be prevented from being a nuisance, which enclosed drains connected with pigsties not infrequently are.

THE FEEDING OF PIGS

In few things connected with the live-stock industry in this country have greater changes been noticed during the last half-century than in the systems, or want of them, connected with the fatting of pigs. Within the memory of many stockmen, the pigs were kept in a growing or store condition for some twelve to fifteen months and then put up to fatten, a process which required some months in order to load the large frame with that enormous amount of fat which alone qualified a pig to be called a fat one. The period spent between the time of weaning and the shutting up of the pig to undergo the fatting process was usually spent in an endeavour to pick up a sufficiency of food to keep body and soul together, and to enable the pig to make that increase in the size of its frame which would in after life enable it to support the load of fat which it was destined to carry ere it yielded up its life to the village pig-killer.

Doubtless there were reasons which at the time appeared to be good and sufficient to our forefathers for this system, which at the present time seems to be so sadly out of date and so unduly costly and wasteful. But it is both advisable and necessary, when making an endeavour to form an estimate of the value of the various systems connected with stock-keeping which were in vogue with our predecessors, to study the conditions then existent. In the first place, the supply of corn, which, when converted into meal, could be fed to fatting pigs at a profit, was extremely small as compared with the enormous supplies of all kinds of feeding-stuffs that we now import from foreign countries. The value of home-grown grain was also so high that only the inferior portion of it, save perhaps peas and beans, was sufficiently low in value to be profitably converted into pork, which was also lower in price than the average of the present time. Another point to be considered was the degree of fatness of the pigs required in the old days, when the curing of pork could only be carried on during the winter portion of the year. A considerable proportion, if not the major part of it, had to be so heavily salted that it could be kept in a sweet condition until the fresh supply was ready in the following autumn. The proportion of fat to lean required was therefore vastly greater than in the present day, when a large quantity of so-called bacon is not allowed to become a fortnight old, as before it has reached that mature age it has passed into consumption. Heavily-salted lean meat is not only unpalatable, but it is not nearly so easily digested as the fat portions of the

side of bacon. It was therefore imperative in those days that the pigs should be very fat; and until the improved system of breeding, and its consequent early maturity, it was impossible to secure this required degree of fatness until the pigs had become fairly-well matured. The ordinary manner in which our forefathers managed their pigs also rendered it desirable, if not imperative, that the pigs should be old and possessed of strong constitutions. In far too many instances the store pig, which had enjoyed almost unlimited freedom for at least twelve months, especially during the few weeks at the conclusion of harvest, when it had been seeking its living on the corn stubbles, would be confined in the sty and put on to a diet consisting of as much meal as its ravenous appetite would enable it to eat. The poor pig would thus be subjected to a fast and a feast, a process which could only prove a trial to its digestive organs. The present profitable system of feeding a certain proportion of vegetable food was not by any means commonly practised. The powers of the pig would thus be subjected to such a test that only a strong and aged pig would be able to withstand. There may have been other reasons for this old-fashioned system of pig feeding which we in our superior wisdom and with our extended knowledge are apt to look back upon with derision.

Two of the causes which have had the greatest effect in bringing about the extraordinary change in the system of pig fattening are the system of mild-curing bacon with the cold-air chamber, which enables the bacon curer to continue the manufacture of bacon all the year round, and the increased earnings of those who labour with their hands, resulting in a more expensive style of living. The consumption of meat *per capita* of the population in Great Britain and Ireland has vastly increased; the number of meals at which meat is consumed each week has increased in a greater proportion. With this change has come another, that is, the more general plan of cooking in the homes of a large majority of householders. These changes have led to the demand for joints of a reduced size, whilst the luxurious tastes of the more highly paid of the community have rendered the demand for the higher quality of meat from young animals much greater in proportion than for larger joints from matured animals. In fact, the tendency all along the line has been for an increased number of small joints of meat, and these from fattened animals which our forefathers would have considered to be immature.

This necessary quality, early maturity, is probably as noticeable in the improved pigs as in any other variety of our improved breeds

of stock; but unfortunately the general pig stock of the country does not exhibit those signs of care in breeding and grading up, which are most desirable in the interests of pig owners. Owners do not appear to have realized the very great difference in the cost of production of pork from the old-fashioned and unimproved pig as compared with one in which flows the blood of parents descended from improved stock. So many pig-feeders imagine that the saving of a few shillings in the first cost of the store or growing pig represents an actual reduction in the cost of the raw material in the production of the fattened pig. There are few greater fallacies than this in connection with the industry. The difference in the cost of fattening a pig of the ordinary mongrel type, which is far too common even at the present time, and a well-bred pig which has been properly reared, is far greater than the two or three shillings lesser cost of the store pig, as not only will the value of the pig be greater per pound, but the time occupied in the process of fattening will be less. This reduction in the time occupied in the fattening process is advantageous in several ways; it also saves the amount of food which is required for the upkeep of the animal, i.e. for the renewal of the various portions of the body and for the supply of animal heat and power to keep the machinery in motion. The daily quantity of food required for these purposes is about 2 lb. to every 100 lb. weight of pig, so that each week at least 1 st. of food is consumed by the pig before the slightest increase in its live weight can be made.

Another point which does not appear to have been thoroughly realized is the fact that as the pig increases in age and weight, so does the amount of food needed to cause an increase in the live weight of the pig become gradually but surely greater. This has been clearly proved by experiments made in the United States and other countries. Henry, in his valuable book, *Feeds and Feeding*, gives tabulated results of trials carried out at many American stations. We append a portion on p. 55.

It may fairly be claimed for these 504 trials, carried out at most if not at all the principal agricultural stations in the States, that they represent the actual conditions with regard to the variations which have for some years been suspected, but not clearly proved, to exist between the amount of food required by pigs and other animals of different ages to make a certain increase in their live weight. Experiments of a somewhat similar character were carried out at the Copenhagen (Denmark) station. These show a similar increase in the amount of food required to make a gain of 100 lb. in the live weight of the pigs as the weight and age of the pig

Weight of Pigs in Pounds.	Actual average weight.	Number of Stations reporting.	Total number of Trials.	Total number of Animals fed.	Average Feed eaten per day.	Feed eaten per 100 lb. live weight.	Average gain per day.	Feed for 100 lb. gain.
15 to 50	lb. 38	9	41	174	lb. 2.23	lb. 5.95	lb. .76	lb. 293
50 „ 100	78	13	100	417	3.35	4.32	.83	400
100 „ 150	128	13	119	495	4.79	3.75	1.10	437
150 „ 200	174	11	107	489	5.91	3.43	1.24	482
200 „ 250	226	12	72	300	6.57	2.91	1.33	498
250 „ 300	271	8	46	223	7.40	2.74	1.46	511
300 „ 350	320	3	19	105	7.50	2.35	1.40	535

increased; but the average amount of food required was in each case greater than in the experiments carried out in the States. This may arise from a difference in the feeding value of the foods used, the breed of pigs, or even from the season during which the experiments were carried on. That the season does have this effect we shall show later on.

The results of the Danish experiments are given as follows:—

	Average Weight of Pigs in Lots.						
	I 35-75 lb.	II 75-115 lb.	III 115-55 lb.	IV 155-95 lb.	V 195-235 lb.	VI 235-75 lb.	VII 275-315 lb.
Number of experi- ments ... }	3	10	13	15	14	11	3
Average feed re- quired—lbs. ... }	376	435	466	513	540	614	639

It will be noticed that the average weight of the pigs is higher than in the experiments carried on in the States, and the results connected with the lowest weights in the Danish experiments are likely to give the more correct information, as the food given to little pigs weighing 15 to 25 lb. alive would most probably be of a more expensive and of a more easily digested character than that given to the older and stronger pigs. Perhaps it might be advisable to leave out of consideration that portion of the figures relating to pigs weighing from 15 to 50 lb. Even if we do this, we shall find that the quantity of food required to make an increase of 100 lb. live weight gradually but surely increases

as the pigs become heavier. Again, the younger and smaller pigs consumed a larger amount of food, as compared with their live weight, than did the older pigs; the proportion of wastage would be less, so that as a pork-making machine the younger and lighter pig has an advantage over the older and heavier one, since it consumes more in proportion to its weight, and also gives a better return for the food eaten. The small pig added about 2 per cent daily to its weight, whilst the 325-lb pig did not increase much more than one-quarter as much proportionately.

The most interesting and important of the columns is probably the last in both series of experiments, as these demonstrate with admirable clearness the fact that the amount of food eaten by a pig in order to add a given increase to its live weight gradually becomes greater as the pig becomes older and heavier. It is clearly proved that a pig weighing about 80 lb. will need 4 lb. of meal in order to add 1 lb. to its live weight, whereas the pig of 320 lb. weight will require one-third more food, or $5\frac{1}{3}$ lb. of meal, in order that it may add 1 lb. to its bulk. This increase in the cost of food by one-third is a very important matter to the pig fattener, whose profits are not, on an average, sufficient to allow for so great an extra cost.

There is still another point which must not be lost sight of, since it is at least of equal importance. It is that in many districts in this country a varying, but generally a considerably higher, price can be realized for small fat pigs than for the heavier pigs. This is more particularly the case when the ordinary fat pig is selling at a reasonable to fairly-low price, as the buyers, having a greater choice are more independent; but in times of scarcity, such as are general every four or five years, there is not that amount of difference between the market value of heavy and light fat pigs. The chief difficulty at these periods of scarcity is to find a sufficiency of fat pigs to supply customers.

Various attempts have been made to account for this great disparity between the actual results of experiments and the almost universal belief amongst the older generation of pig-feeders that the fattening pig pays best during its later stages, or when it has reached the weight of about 250 lb. The nearly-ripe and completely-fattened pig perhaps appears to make increased gains during the latter stages of fattening, but this is solely due to the fact that the increase made by the pig nearing its state of complete fatness is visible to the naked eye. The additional fat is placed on the outside of the carcass, where an observant feeder cannot help noticing it, whilst with the younger and less-mature pig this is not to the same extent the case.

It is alleged that one of the chief drawbacks to farming is the infrequency with which the farmer's capital is turned over, the assumption being that the farmer's capital is not completely utilized, owing to the few transactions or sales, each of which is supposed to result in profit. If this be so, it surely should be an advantage if the same amount, or a slightly-increased amount, of capital could be so employed that twice as much pork could be manufactured in a given time, especially if, as is pointed out, the growing or maturing and fattening processes could more cheaply be carried on at one and the same time. The same buildings would be suitable, whilst the cost of labour and attention would be only slightly higher, and this would be counterbalanced by the greater quantity and improved quality of the resultant manure.

This system of combined growing and fattening of pigs also lends itself admirably to the practice of breeding the pigs one fattens, and thus saving unavoidable loss in transit from the sty of the breeder to that of the fatterer, the intervening journey to market, the consequent exposure and risk of loss from disease, as well as the expenses and profits of the dealer. At each change of home the pig is sure to lose flesh, due partly to exposure and partially to change of food and surroundings. At least a week's time and food is lost. In any case, there can be little doubt that under present conditions the best and most profitable system is to produce pork, as quickly as is consistent with safety, from young and growing pigs.

REQUIREMENTS OF THE CONSUMER

The most successful manufacturer of articles in general use is the one who most closely studies the wants of his customers and produces that which supplies their needs at the least expense. The requirements of consumers of pork vary considerably in various parts of the country. Climate and the occupation of the majority of the people in a district together appear to have a determining influence on the size and degree of fatness of the pig which is most in demand. In the south-eastern portions of England the fat pig which weighs alive from 80 to 90 lb., and furnishes a carcass of pork which weighs from 60 to 70 lb., is in most general demand, and it realizes a higher price than any other class of pork. In the Central Midlands a pig weighing up to 140 lb. alive, and weighing when dressed from 100 to 110 lb., appears to be most in favour. Then in the western and south-western counties, as in Lancashire, and indeed in all the manufacturing

districts, a live pig of at least 300 lb. appeals most strongly to the artisan and mechanic. At one time most of the bacon factories were located in the south of Ireland, in the county of Ayr, or in Wilts and the adjoining counties, but of late years factories have been started in other portions of the kingdom. For the supply of bacon a particular type of fat pig is required owing to the greatly-increased value of certain portions of the side of bacon. The middle portion is in much the greatest demand, it therefore realizes the highest price. The hind quarter is the next most valuable part, whilst the fore quarter is the least fashionable, and consequently the lowest in value. These are obvious reasons for the bacon curer desiring to purchase pigs long in the side, square, and well-developed in the hind quarters, and light in the shoulders and fore quarter generally. Further, the public now demand bacon possessing a large proportion of lean to fat, and this from comparatively young pigs; therefore the wise pig-feeder is he who selects pigs possessing these required characteristics, and who proceeds to so feed them that they are fit for slaughter at as early an age as is possible.

Pigs should be properly fed from their earliest stages. There is little doubt that under the old system of pig-keeping time and food were lost by want of attention in so feeding the newly-weaned pigs that the store of fat built up whilst the pigs were on the sow was not preserved. It is at this period in the life of the pig that flesh is most easily and cheaply produced, and this of the best character, such as can only with great difficulty and cost be reproduced. The object of the pig-man should be to so feed the sow and pigs that the latter have become accustomed to fairly rich and nourishing food, so that the loss of the milk from the sow shall be counterbalanced by a little extra food fed direct to the young pigs. Of course care will be needed not to so feed as to cause an attack of biliousness or indigestion, or the result will be a certain loss of flesh, if not a permanent check on the thrift of the pig. Selection should be made of those foods which are both nutritious and easily digested.

COOKED FOOD FOR PIGS

Some few years since an idea prevailed amongst pig-keepers that the cooking or steaming of the food on which pigs were kept was most advantageous. It was contended that the process rendered the food more easily digested, and thus enabled the pig to consume a larger quantity of it, whilst the amount of nourishment was

increased by the operation. Thus the pig so fed would be fattened in a shorter time and on a reduced quantity of food. It was also claimed that the saving in the cost of food eaten more than covered the expense of cooking or steaming the food. An endeavour was made in this country to discover, if possible, whether or not the claim made that the operation of cooking enabled pigs to consume a greater quantity of food with beneficial results was a fact. The tests made were admittedly incomplete, but they clearly proved the falsity of one claim, viz. that pigs would consume a larger quantity of cooked than of uncooked food. In one recorded case in which maize was the food used, those pigs which were fed on the uncooked maize ate daily a greater weight of maize when uncooked than when it was cooked.

The agricultural stations in Denmark, Germany, and the United States have since made very careful tests on this point, and the results are very fully and clearly set out in Henry's valuable work. Details of a considerable number of experiments are given, which were carried out at the various stations in the United States and in Canada. The large majority of the trials were against the utility of cooking; five of the many trials at the Wisconsin station appear to have shown some slight benefit from cooking, whilst the whole of the others proved the reverse. It is further stated by Henry that the five mentioned trials were the only ones of which he had heard where favourable results had been noticed. The concluding paragraph of the article is as follows: "Including all the trials, then, so far as known, that have been favourable to cooking food, and omitting many, for lack of space, that are unfavourable to that operation, the average shows that 476 lb. of uncooked meal or grain were required for 100 lb. of gain with pigs, while after the corn or meal was cooked 505 lb. were required. This shows a loss of 6 per cent of the feeding value of the substances through cooking." Even without the addition of the cost of cooking the food, this would show a loss of what is generally considered a fair profit on the fattening of pigs.

Besides this, it is not at all unlikely that a still-greater loss would have been shown if the whole of the cooked food had been fed to the pigs when cold, or in that condition in which the major portion of the pig food is fed to the pigs in this country. So far as can be discovered, no mention is made on this point with regard to the trials made in the States, so it may be possible that a supply of food sufficient for several days may have been cooked at one time, and that a portion at least of this would have been fed after it had cooled down. This would have made a greater difference

in a country where the cold is more intense in winter than in this country. With us the food which has been cooked is generally fed in a warm state. This would give it a very considerable advantage over the uncooked food, which is more frequently mixed with cold water just prior to its being fed to the pigs. That this last plan is a mistake must be evident. Frequently young pigs which are fed with cold slop return to their nest shaking with cold, when they pile themselves upon each other in the vain endeavour to become warm and comfortable. Indigestion is very likely to follow, whilst a loss of animal heat is certain, and this means a wastage of a portion of the food. Experiments have shown that it is profitable and very advantageous to incur the expense of heating water, so that the food when fed to the pigs is of about the temperature of 60° F.

SOAKING OF MEAL

Another point which is frequently overlooked by pig men is the great benefit derived from soaking the meal in water for at least twelve hours prior to its being fed to the pigs. In cool weather this period may be extended with advantage to twenty-four hours; but when the weather is hot there is a probability of fermentation setting in, and this does not add to the feeding value of the meal. We have advisedly used the word meal, since we are of opinion that all corn given to fattening pigs should be ground as finely as is possible. This is more especially necessary with maize, unless it be thoroughly soaked, as the young pigs have a difficulty in completely masticating it when hard and dry. Experiments were carried out at the Wisconsin station with pigs of various ages, a part being fed on whole maize and the other part on maize meal. In every instance the advantage rested with the meal. The average benefit derived from the grinding was about 8 per cent. The pigs ate on an average 499 lb. of the whole corn, and only 459 lb. of the meal in increasing their live weight 100 lb.

In some districts where there exists a difficulty in getting the corn ground, some pig-feeders adopt the system of soaking the whole corn in water for twenty-four hours and then drawing off the water, leaving the moistened corn in the tub, or taken out of the tub and placed in a heap and covered up with bagging. It is thus left for a few days until it has commenced to germinate. It is claimed that better returns are obtained from this sprouted grain than from the grain which is merely soaked, whilst a few old-fashioned pig men go still further, and declare that the value of

sprouting is wellnigh the equal of grinding corn for the fattening of pigs.

FEEDING MEAL DRY

At the present time we hear little of the system of feeding the dry meal in one trough and giving the water to the fattening pigs in a second trough. This plan was strongly recommended a number of years since by a small landowner and brewer, who for some thirty years fattened some hundreds of pigs, all of which were bought as stores and thus bred by various people; still, the profit resulting amounted to an average of about £200 per annum. Everything was exceedingly well managed. A splendid barn-like building covered with thatch was erected, the whole of the corn was ground at home, and each lot of pigs had its food weighed out to them. The pigs were all weighed on being bought in, and at varying periods during the fattening process as well as when sold. Every detail was carefully recorded; a charge made for anything grown on the farm and fed to the pigs, and also for labour. The owner was a believer in feeding the meal dry, and after several tests between feeding the meal and water separate and the two mixed in the ordinary manner, he was convinced that, if carefully and properly fed, the pigs fed on the dry meal gave a better return than those fed on the mixture. This system of dry feeding was then followed until the death of the owner. There appeared to be some little waste of the dry meal, and the pigs were very much longer on their feet when eating, but a better return was made for their food. This was considered to be mainly due to the fact that when fed dry the meal was more thoroughly mixed with the saliva of the pig, and that in cold weather the pigs drank less water than they would be compelled to take in the mixture, and so less animal heat was required to warm up the water consumed. Prior to the adoption of this system, experiments had been made in the feeding of meal mixed with a little water, and with meal mixed with so considerable a quantity of water as to make a thin slop. The results were most decidedly in favour of the smaller quantity of water, and these were the precursor of the test of giving the meal and the water in separate troughs.

VEGETABLE FOOD

It is more than probable that pig-keepers generally have not given sufficient attention to the feeding of vegetable matter to their pigs, particularly to those which are being fattened. Although

the fact that pigs in their wild state exist largely on vegetable matter, such as grass, roots, &c., is present in their mind, and the practice is by no means uncommon of turning breeding stock and store pigs out to grass, yet it appears to be overlooked that vegetable matter forms the chief food of the wild pig, which has laid up a store of fat for the coming winter, or, as we should term it, has become fat enough to be converted into pork. It is true that in the autumn a considerable quantity of the fruit of the oak, chestnut, beech, and other trees is available in differing parts of the country, and is largely consumed by pigs having their liberty, yet the main food during the major portion of the year is of a vegetable nature other than the seeds of trees. For some reason or other which is not on the surface, few pig men appear to make it a practice to give roots of different kinds, save potatoes, nor many of the forms of green food, such as clover, lucerne, tares, or even grass, to their fattening pigs; yet there is not the slightest doubt that the giving of roots or green food to the extent of 10 per cent of their food, the remainder being meal, will result in a considerable saving, as in the majority of cases the pigs will make an equal gain on a mixture of 90 per cent meal and 10 per cent vegetable food as they would on food consisting entirely of meal. The cost of the roots, &c., would, of course, be very considerably less than that of the meal. In the United States and Canada large areas of land are sown with rape seed, the resultant crop being folded off with pigs receiving a variable quantity of corn or meal, much in the same way as roots are folded off with sheep in this country. The practice is declared to be successful, as not only do the pigs give a return for the feed, &c., but the folding is a fine preparation for the following crop of corn. Lucerne, or alfalfa as it is there termed, is treated in the same way, with most beneficial results. This system has been claimed by some of the pig men in the States as having emanated from their fertile brain, but in this, as in many other things, it is an old system revived. In the 'fifties of the last century it was a very common practice in Suffolk, a part of Cambridgeshire, and other counties, to feed off the white clover crop by the aid of pigs, which also received a certain quantity of other food, most frequently peas or beans, grown on another portion of the farm. The pigs, old, young, and those fattening, made good progress, and at the same time thoroughly manured the soil for the following crop of wheat. Where necessary, temporary shelters were erected, which frequently consisted merely of two lines of hurdles set as far apart as would be covered by double hurdles stuffed with straw. These shelters

allowed a free current of air and protected the skin of the pigs from the heat of the sun. A successful endeavour was made some years since by a landowner who had to take possession of a heavy-land farm which had been so neglected that a tenant at a fair rent could not be obtained. One or two fields adjacent to the farm buildings had been laid down with permanent grass seeds, but these had been mown until they appeared to be impoverished. Some hundreds of strong store pigs were purchased and placed on the grass fields. A quantity of maize and peas was also bought. A shepherd's house was placed in the field in which the corn was stored. Three large tubs were also carted to the field; these were utilized in the soaking of the corn. The shelters, such as described above, and the troughs were shifted every two or three days, so that the droppings of the pigs were evenly distributed over the whole field. The results were two—a considerable profit beyond the cost of pigs, food, and labour; and vastly improved grass land, which has retained the marked improvement for a number of years.

It is quite possible to arrange for a supply of green food on the farm during the whole of the year. Roots, such as potatoes, white turnips, swedes, kohlrabi, cabbages, or mangel-wurzel, are suitable at various times from September to July, whilst green rye, vetches, lucerne, clover, rape, and grass are obtainable within the months of April and September. A belief appears to exist amongst pig-keepers in certain districts that roots of all kinds should be cooked ere they are fed to pigs. Save in the case of potatoes, no good cause has been shown for the practice; indeed, the probabilities seem to be against the operation. Some portion of the favour granted to cooked vegetables may have been due to the fact that, if the cooked roots are fed in a warm state, the ill effects of giving to pigs a large quantity of frozen or very cold roots early in the day is not observable; but the avoidance of the chill sustained by the pigs is not due solely to the cooking, but to the observance of the common-sense rule that all food whatsoever fed to pigs should, in very cold weather at least, be warmed by some means or other before it is fed, so that the latter are not compelled to utilize their body heat—which means so much of the food—to raise the food to the temperature of about 60° F.

In the feeding of grasses, clovers, rye, &c., care should be taken that it has not become old and stalky, or indigestion and other troubles are very likely to result. Again, with pigs until they reach the age of about three months, only a small quantity of

lucerne, &c., should be fed. As the pigs mature and the digestive organs become stronger, pigs will thrive and grow readily on a diet mainly consisting of lucerne and some other kinds of vegetable food, but these feeds are of greater value as an additional rather than as a main food. Although experiments carried out in various countries have demonstrated the fact that in the feeding of pigs largely on potatoes, roots, &c., the feeding value of these is about one-sixth that of barley, yet the best return from roots, &c., is shown when they form about one-tenth part of the ration of the pig. Under these conditions, returns have in some cases been equal to those where meal has been the only food. It has not yet been satisfactorily determined exactly why this one-tenth portion of food, which is considered to be of only one-sixth the value of meal, should, when combined with meal, give as good returns as are obtained from a diet composed entirely of meal. Still, such is stated to be a fact. It may be that the meal alone is of too concentrated or rich a character for the digestive organs of the pig, or it may arise from the roots having some effect on the digestive organs or the intestines.

PIGS AND DAIRYING

One of the chief reasons assigned for the alleged reduction in the number of pigs bred in this country is the enormous increase in the consumption of milk in the towns. Whole districts in which cheese or butter making was carried on are now without a butter churn or cheese press at work in it. The whole of the milk—and this to a very much greater extent is produced—is sent away each morning and evening to the large towns, some of them scores of miles away. Many pigs were kept in these particular districts mainly for the purpose of consuming the skim milk, buttermilk, or whey, which formed the chief portion of the diet of the pigs. Pork of a very fine quality was manufactured when care was taken in the selection of the suitable additional food, and when it was given in sufficient quantities. So accustomed were many of the cow-keepers to this cheap food, which was considered to amount in value for pig feeding to from £1 to £1, 10s. per cow each season, that when the milk-selling business commenced, the keeping of pigs was gradually allowed to lapse. It is not for outsiders to express an opinion on the wisdom or the reverse of such a proceeding, but it may be pointed out that it is quite possible to breed and fatten pigs profitably over an average of years without the slightest aid from the dairy; and further, that the pigs actually

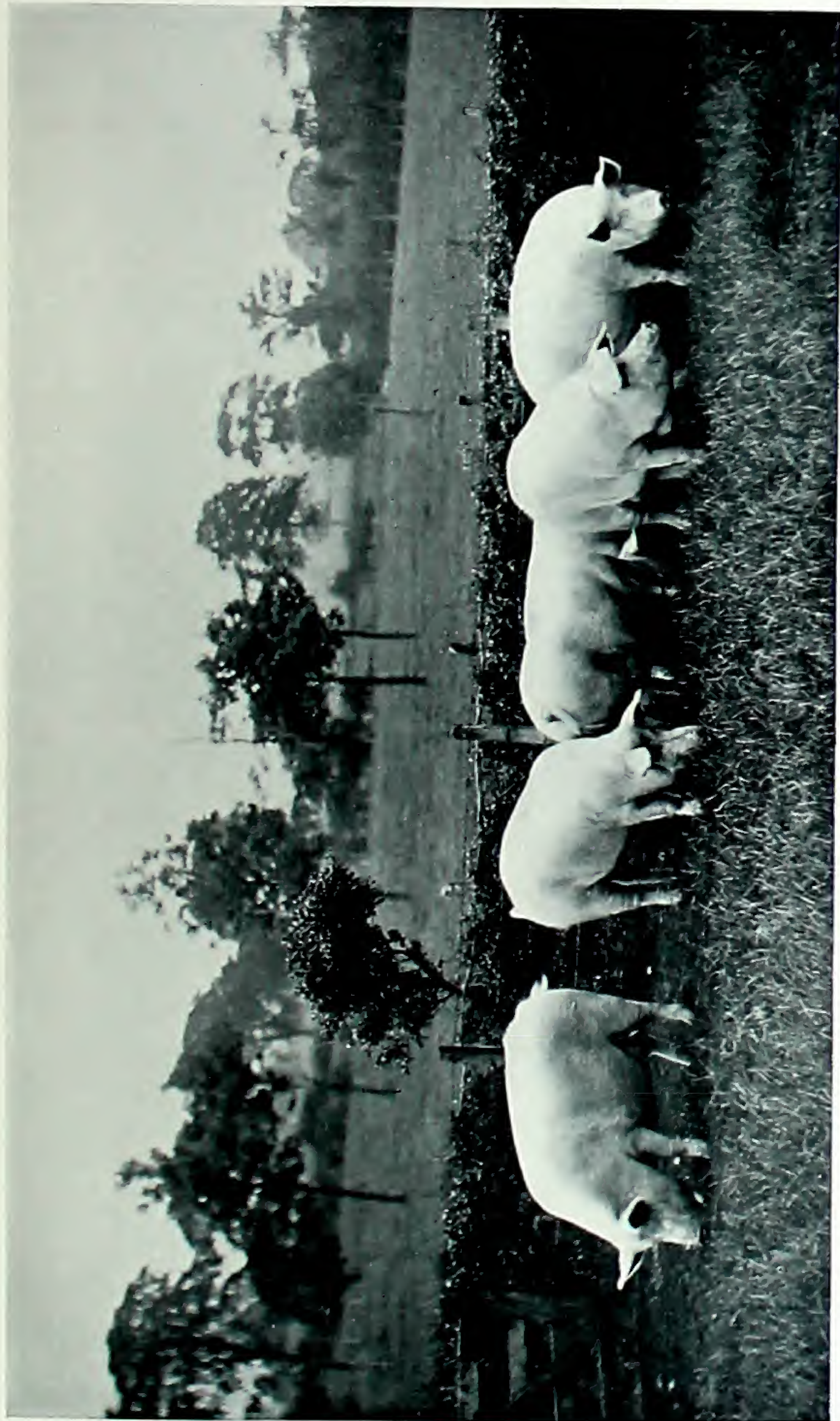


Photo. Parsons

LARGE WHITE SOWS



thrive better and leave a greater profit, as well as produce superior pork, when the dairy offals comprise only a limited portion of their daily food. This is especially the case with young pigs. Many persons who have at command a large quantity of separated milk make the mistake of giving an almost unlimited quantity of it to young pigs newly weaned. In many cases the result is indigestion, constipation, and a serious check to their growth. If it be necessary to consume so large a quantity of separated milk by the aid of the young pigs, by all means give it through the sow, going so far as to leave the pigs on the sow a somewhat lengthened period for the purpose. Then the consumption of the separated milk, instead of being a hindrance and a check to the pigs, will give them a splendid start, and render them far more able to treat the separated milk when at last they are weaned from the sow. The causes for this are several, two of them being that the separated milk, having been deprived of practically the whole of the fat, is an unbalanced food, which is beyond the powers of the digestive organs of the young pigs to treat. An excess of it, or feeding mainly on it, causes indigestion in the pigs, which shows itself in various ways, amongst others in discoloration of the skin and a general appearance of unthriftiness. The sow possessing stronger digestive organs can digest a considerable quantity of separated milk without any inconvenience to herself. Not only so, but the consumption of separated milk by the sow enables her to produce much larger quantities of milk herself, which is in the best form possible for the young pigs suckling her. The loss of the two or three weeks extra between the times of farrowing is more than counterbalanced by the sow becoming much stronger, and so entirely recovering from the strain of producing and rearing a large litter of pigs, that she will readily come in heat as soon as the pigs are weaned, and frequently before this takes place. The advantage from the sow being in robust health and strength when mated with the boar will be shown in her producing a numerous and strong litter, providing that she be properly and carefully fed during the supervening four months.

Even with older and fattening pigs, the mistake of giving too great a proportion of separated milk to the other food is frequently made when a large quantity of milk and other dairy offals are available. The value of dairy offals alone for pig feeding may easily be exaggerated. It has been asserted by men who considered themselves authorities that separated milk was not worth 1*d.* per gallon of 10 lb. for pig feeding; whereas, if it be properly

used and in small quantities, it can be made of wellnigh twice as much value when pork is selling at a remunerative price.

EXPERIMENTS ON PIG FEEDING

A series of experiments were carried out at the Utah agricultural station, primarily with a view to discovering the value of meal, of milk and meal, and of milk alone in the feeding of pigs. The average weight of the pigs was about 47 lb., so that they would be what are termed strong stores. Altogether seven tests were made, the meal used varying. At times it was a mixture of equal parts of barley and bran, of corn and wheat, wheat and bran, corn meal and bran, and, in two instances, ground wheat. The proportion of milk to meal was about five to one at the commencement of the tests, the amount of milk being smaller towards the end of the experiments. These last continued over some twelve weeks. The pigs fed on meal and milk made an average gain of 1.27 lb. per day, those fed on meal alone increased daily .91 lb., whilst those fed solely on milk gained .68 lb. only per day. The quantity of each kind or mixture of food to make an increase of 100 lb. in live weight was: of meal 292 lb., and milk 768 lb., of meal alone 470 lb., and of milk alone 3312 lb. From this it was assumed that in this experiment, where the average proportion of milk to meal was about $2\frac{1}{2}$ to 1, the value of 100 lb. of milk was the same as that of 23.2 lb. of meal. It was also shown that when meal and milk were fed in combination, a smaller quantity of digestible dry matter was required for each 100 lb. of gain than when either milk or meal was fed alone, the proportions being 258, 285, and 319. This would appear to prove that milk and meal in combination are of greater feeding value than either when fed separately. The feeding value of the milk, when fed in conjunction with meal, comes out at nearly one-fourth the value of meal, or 1 gall. of milk is made out to be equal in value to over $2\frac{1}{4}$ lb. of meal, or at least $2\frac{1}{2}$ d. per gall. when compared with the price current for pig-fattening meal. The weight of food eaten daily by these pigs was by no means excessive; those fed on the mixture ate 3.73 lb. of meal and 9.74 lb. of milk each, the meal-fed pigs each consumed 4.41 lb., and those fed solely on milk ate 22.28 lb. daily. The figures also show that milk, when fed in combination with meal in the proportion as above, 100 lb. of milk made a gain of 23.2 lb., whilst when fed alone the return was only 14.2, or rather of half as much value.

Another series of experiments were carried out at the Tennessee

station, which not only proved how advantageous it is to feed milk with meal, but also that a mixture of meals fed in conjunction with dairy offals is still more successful. This question of a mixture of foods will be referred to subsequently. A number of pigs were selected, a lot—four—were fed daily, at the beginning of the experiment, on 6 lb. of corn meal and 10 lb. of water, twice daily, increased towards the end of the period of sixty days to 8 lb. of corn meal and 16 lb. of water. A second lot were fed twice daily on 6 lb. of corn meal and 18 lb. of skim milk, increased towards the end to 8 lb. of corn meal and 40 lb. of skim milk. The third lot had 4 lb. of corn meal and 12 lb. of skim milk for the first fifteen days, and 1.75 lb. of wheat meal and 6.25 lb. of corn meal and 40 lb. of whey towards the close. The fourth lot was fed on 2.66 lb. of corn meal, 4 lb. of cow-pea hay, and 8 lb. of skim milk twice daily at the beginning of the trial, this being changed towards the close to 5.5 lb. of corn meal, 1.5 lb. chopped cow-pea hay, and 26.75 lb. of skim milk. The average daily gains in live weight of each pig in the lots were, respectively, 1 lb., 2.3 lb., 2.2 lb., and 2 lb. The various kinds of foods were valued at current prices, and the profit left by each lot of pigs was, in the order given, £1, 10s., £1, 10s., £2, 8s., £2, 19s. 6d., and 16s. 3d. Another point brought out, important to those pig-feeders who sell their pigs by dead weight, was that the average dressed weight of the four lots of pigs came out as 73.6 per cent, 78.5 per cent, 76.2 per cent, and 77.7 per cent, the three mixed-fed lot of pigs coming out better by an average of about 4 per cent than those pigs fed on one food in addition to water. It may be considered that the profit left on each lot of pigs was small; but it should be noticed that they were sold at 5½ cents (2¾d.) per lb. live weight, or about 3½d. per lb. dead weight, which is exceedingly low compared with the prices current in this country in 1914 of at least 7½d., or more than twice as much.

The advantage of using skim milk in conjunction with maize meal was still further exemplified in another experiment. One lot of seven pigs was fed on corn meal alone, whilst a lot of equal number was fed on corn meal and skim milk in the proportion of 1 to 8 at the early part of the time, and during the latter portion the proportion of meal was increased to 1 to 7. The pigs fed on meal alone required 410 lb. to make an increase of 100 lb. in live weight, whilst those fed on meal and milk needed 160 lb. of the former and 1190 lb. of the latter to make an equal increase. The pigs fed on the mixture actually ate within a trifle as much corn meal as the other lot, and, in addition, 3686 lb. of milk; yet the cost of increase of 100 lb. was over one-fifth less, and

the profit nearly four times as great. There is one point to which attention ought perhaps to be called—that the whole of these experiments, and most of the many others carried out for the same purpose in the United States, have been with milk used in conjunction with maize meal. It is very probable that the results will prove to be more favourable in these cases than where pig foods of other kinds, such as barley, peas, beans, &c., are commonly used, as in this country; still, the results of these and other tests carried out in various countries fully confirm the belief in the great value of dairy offals in the feeding and the fattening of pigs when they are properly used. Further, even better returns are obtained from the use of dairy offals with other foods than the actual feeding value of the milk, &c., contained therein.

A very considerable number of experiments in feeding skim or separated milk to pigs have also been carried out in Denmark, where its value is estimated to be about one-sixth as much as barley meal, but it is possible that still better results would have been experienced from its use had a smaller proportion of the milk to the meal been used. This has been proved to be the case in the United States, for instance, in the nineteen trials at the Wisconsin station, where milk in the proportion of 1 part to 9 parts of meal, and this with pigs of all ages, it was proved that $4\frac{3}{4}$ lb. of milk gave an average return equal to 1 lb. of meal. Very similar results were obtained at the Utah station,¹ where 100 lb. of milk gave an increase in the live weight of the pigs equal to that obtained from 25 lb. of meal. Professor Grisdale, who is a great authority and a most careful experimenter, values separated milk at from one-fifth to one-sixth the value of meal; but here again the proportion of milk to meal used has been somewhat greater. It may safely be assumed that the value of separated milk increases up to a certain point as its proportion to meals fed decreases, and that older pigs will give a better return from its use than will young or newly-weaned pigs and those on the sow, unless the milk be fed to them through the sow. The further deduction may be not unfairly drawn that separated milk has a value when fed to pigs in conjunction with meal greater than its intrinsic value, and also that this extraneous value proportionately decreases as the balance of milk to meal becomes greater.

¹ The actual facts as obtained at Wisconsin appear to be that when feeding 1 lb. of corn meal with from 1 to 3 lb. of separated milk, 327 lb. of milk saved 100 lb. of meal. When feeding 1 lb. of corn meal with from 3 to 5 lb. of separated milk, 446 lb. of milk saved 100 lb. of meal. When feeding 1 lb. of corn meal with 5 to 7 lb. of separated milk, 574 lb. of milk saved 100 lb. of meal. When feeding 1 lb. of corn meal with 7 to 9 lb. of separated milk, 552 lb. of milk saved 100 lb. of meal.

The value of buttermilk in the fattening of pigs does not appear to have been generally realized by our forefathers. It might be thought that this neglect of a really good pig food was due to want of observation, since in the good old times the competition in life was not nearly so keen as now, and so many farming operations were carried on by rule of thumb. But probably a more potent cause of the neglect of buttermilk by the pig-keeper was the large amount of salt contained in it, which rendered it dangerous to use mainly alone. It was therefore emptied into those vile receptacles called swill tubs, or vats, where the mass of refuse or even garbage from the farmhouse was in a continual state of ferment. The small proportion of buttermilk in comparison with the other refuse enabled the pig-man to use it without the usual ill results which arise from the feeding to the pigs of an excessive amount of salt. The improved system of dairying which is now general has removed this risk of harm, so that buttermilk may be considered of at least equal value to separated milk, and even more suitable for young pigs, since it contains a larger amount of fat. An experiment with the use of separated milk and buttermilk really gave a better return from the latter.

Whey is generally looked upon in the western counties as a valuable aid in the manufacture of pork. It is a noticeable fact that a very considerable proportion of the prize-winning pigs at the Smithfield Club's shows, where the finest specimens of the porcine tribe are annually on exhibition, are owned by cheese-makers, or by those who are able to obtain a regular supply of whey, or sufficient to enable them to store in casks a sufficiency to carry the pigs through to the show. The use of whey to these exhibition pigs appears to give to them a bloom and finish which is not so observable in those pigs which have been fattened without milk or whey. This greatly helps the user of dairy offals, since this extra finish and bloom in the pigs at times determines the question of superiority. Henry reports trials of whey at Wisconsin as follows:—

FIRST TRIAL

	No. of Pigs in Trial.		Daily Gain per Head. lb.		Food for 100 lb. Gain. Meal. lb.		Whey. lb.	
Lot 1	...	3	...	1.00	...	463	...	—
" 2	...	3	...	1.47	...	327	...	687
" 3	...	3	...	1.11	...	257	...	1815
" 4	...	3	...	1.13	...	181	...	1871
Average for whey-fed lots					...	255	...	1458

SECOND TRIAL

	No. of Pigs in Trial.			Daily Gain per Head. lb.		Food for 100 lb. Gain. Meal. lb.		Whey. lb.
Lot 1	...	4	...	.93	...	486	...	—
" 2	...	4	...	1.21	...	372	...	1100
" 3	...	4	...	1.12	...	289	...	1726
" 4	...	4	...	1.09	...	232	...	2309
Average for whey-fed lots						296	...	1712

These results show that when meal alone was fed it required some 481 lb. of meal to make an increase of 100 lb. in the live weight of the pigs, whilst 303 lb. of meal and 1308 lb. of whey gave an equal increase, which showed that 7.85 lb. of whey gave a return equal to that of 1 lb. of meal. Further, that the greatest daily increase was made in both these trials where a smaller proportion of whey to meal was fed. This points to the fact that, as with separated milk, whey is of greater feeding value when fed in comparatively small proportionate quantities. Very similar results were obtained at the Ontario Agricultural College, where a lot of pigs fed on meal alone gained daily 1.43 lb. per head, when they required 494 lb. of meal to make an increase of 100 lb. When the whey was fed in addition, the gain of 100 lb. was secured by the consumption of 382 lb. of meal and 840 lb. of whey, the average daily gain per pig being 1.77 lb., or 0.33 lb. greater than when meal was fed without the whey. This shows the value of whey to be $7\frac{1}{2}$ times less than meal, or a somewhat better return than the average of the Wisconsin trials; but it should be noticed that the proportion of whey to meal is less, and thus affords a proof of the inference that a limited use of whey in pig fattening is preferable to a lavish use of it if the most profitable return from both meal and whey is desired.

At that time the late Sir John Lawes was making a number of experiments at Rothamsted, in order to discover the best and cheapest kinds of meal for the fattening of pigs. It appeared to be the common belief that pigs which were being fattened would make as great a return from one kind of meal as they would make from the consumption of an equal weight of meal of various kinds. The most important conclusion arrived at, or that which appears to stand out prominently in the report, is the one that barley meal is the best single pig-fattening food. This is in accordance both with the belief and the practice of many pig fatteners at the present time; but one of the effects of this pronouncement has been to

withdraw attention from a much more important fact, viz. that pigs can be much more cheaply fattened on a diet composed of different kinds of meals, and further, that the addition of some 10 per cent of vegetable food of various kinds, which is in an easily-digestible form, will give a return equal to that in which meals form the sole food. These beneficial results appear to be obtainable when cooked potatoes, raw mangels, carrots, swedes, kohlrabi, and other roots are used, although the results may be affected by the variety of roots, since boiled potatoes are considered, when used even to the extent of 40 per cent, to be worth one-fourth as much as meal, whilst mangels have been proved to be of half as great value. It was also concluded from the results of these experiments in which roots were fed in conjunction with meal, that the quality of the pork was equally as good as when meal alone was used. This does not seem to be in accord with the general opinion held by the curers of bacon in Ireland, who contend that soft and oily bacon frequently results from the use of roots in the fatting of the pigs. It is quite possible that this fear is well founded, but it is more than probable that the chief cause of this drawback is the fact that the roots are fed in conjunction with maize meal, which is the principal pig food used in many parts of Ireland. Of course it may be that some of the Irish farmers are in the habit of using too large a proportion of roots, but even then the trouble would be less likely to arise if the meal was of a mixed character, or even if it consisted of half maize and half barley meal. It seems strange to outsiders that so comparatively small a quantity of barley should be used in the fatting of pigs in Ireland, especially as pork from maize-fed pigs is of inferior character, unless it is cooked, or dairy offals be used with it. At the same time this cooking of maize meal reduces its feeding value, whilst the pork is of greater value to the bacon curer, who thus gains at the expense of the pig owner, who would secure better returns at less cost if he would use the corn which he may possibly grow on his own land, or which is grown by his neighbours. So far as we are aware, no good and sufficient reason has been discovered for this alleged equality of the mixture of nine-tenths meal and one-tenth vegetable matter with meal alone. It may be that the vegetable food assists the digestive organs, or that the adulterated meal furnishes as much nutrition as is within the power of the fatting pig to assimilate.

The published results of a certain farmer's experience in the fatting of pigs clearly showed that the mixing of foods was advantageous, and also proved that wheat alone or wheat in conjunction with some other foods was not only unsuitable but very unprofit-

able. The experiments were the result of the advice of a well-known pig expert, who was applied to by a farmer whose pigs had ceased to thrive when fed mainly on wheat meal. He had attempted to improve matters by adding molassine meal and dried grains to the wheat meal and potatoes, but on this mixture the pigs made even less progress. The advice given was to omit the two extraneous foods, since they both contained an undue proportion of indigestible fibre, to reduce the wheat meal to 40 per cent, and to add 30 per cent of barley meal, 20 per cent of maize meal, and 10 per cent of fish meal. Eighteen pigs had been divided in three lots, and after being fed for a fortnight on the wheat meal, molassine meal, and dried grains with roots added, had made a gain in live weight of 225 lb., or a daily gain of about 14 oz. per pig. The three lots of pigs were then fed on the suggested mixture of meals, composed of wheat, maize, barley, and fish refuse, for a period of ten days, when the three lots of pigs had respectively gained 244 lb., 233 lb., and 214 lb., or each lot of six pigs had on an average made a greater increase within ten days than the whole eighteen pigs had made in the longer period of fourteen days when fed mainly on wheat meal. That the quality of the pork made was good was clearly proved by the price made of the fat pigs. The results were of so satisfactory a nature, that the farmer decided to continue to feed his fattening pigs in a similar manner. Two lots of five each were weighed when put up to fatten, and fed on a similar mixture, and made a daily gain of nearly $2\frac{1}{2}$ lb. over a period lasting from 7th February to 17th March. These pigs were kept from food for about eight hours, and sold at 53s. 4d. per cwt. live weight, or about 12s. 6d. per score pounds dead weight. A still further lot of pigs were weighed and fed on the mixed meal, and these made a daily gain of 2.15 lb. per pig. The daily consumption of meal was about 9 lb., so that 1 lb. of live weight was gained from the consumption of about 4 lb. of the mixed meal. Another point brought out in these tests was that the pigs fed on this mixture of meal gave a much higher percentage of dead to live weight than the pigs fed by the same owner in the ordinary way had given in previous years. This had been from 75 to $72\frac{1}{2}$ per cent, whereas the net weight of these mixed-meal-fed pigs, in which fish meal formed 10 per cent of the bulk, was 78 per cent, or an average gain of $4\frac{1}{4}$ per cent, and at least 2 per cent over the average net weight obtained at the chief bacon-curing establishments.

SUMMER AND WINTER FATTENING

In the days of our fathers there seemed to be good and sufficient reasons for the fattening of pigs in this country being mainly confined to the winter months. This for at least two reasons, one of which is the view expressed in the old distich, "Pork is out of fashion when there is no *r* in the month", i.e. during the months of May, June, July, and August; the other reason being that to which reference has been made earlier as to some of the causes which led farmers to fatten their pigs in the autumn, winter, or very early spring. The complete change in the system of bacon-curing at present followed, and a partial change in the opinion as to eating pork in the warmer months of the year, have together altered the conditions. Of late years the market value of pork has been on the average higher during some of the summer months than at any other time of the year. This alone is a sufficient cause for pig owners extending their operations over the summer months; but there is still another and a more cogent reason for this extension of the pig-fattening period, and that is the general belief, supported by experiments, that a smaller quantity of food is required in summer than in winter to produce one pound of pork. Experiments on a considerable scale were carried out in Denmark over a series of years, having for their object the elucidation of facts concerning this point, which seems to have arisen in the first place solely from the observation of practical men. Every effort was made to ensure that the conditions under which the experiments were carried out should be as much as possible similar to those common on the farm, pigs of varying live weights, from 35 lb. to 155 lb. were employed; one hundred of these experiments were carried out in summer, and ninety-nine in winter, some 2500 pigs being altogether fed. In all the trials the skim milk, whey, roots, &c., fed were reduced to their grain equivalents, as determined by various trials. The average food eaten (grain equivalent) per day per pig was in summer 3.94 lb., and in winter 3.96 lb. The feed (grain equivalent) required by the pigs of various weights was—pigs from 35 lb. to 75 lb., in winter 371 lb., and in summer 346 lb.; pigs from 75 lb. to 115 lb. ate in winter 446 lbs., and in summer 397 lb.; whilst pigs weighing from 115 lb. to 155 lb. consumed in winter 516 lb., and in summer 457 lb., in making an increase in their live weight of 100 lb.; the average coming out at 444 lb. in winter and 400 lb. in summer, or about 11 per cent to the advantage of the summer fattening of pigs. This must come as a great surprise to many of our pig men, who, however, must make some

allowance for the fact that the winters in Denmark may be somewhat colder than in the southern counties of England and Wales and in Ireland; still, this variation in the temperature in the various parts cannot account for the enormous difference in the saving from the summer production of pork as compared with winter fattening. From the results of these and other experiments already discussed, and the general observations made in this chapter, the reader will gain some idea of the principles upon which pig feeding in modern practice should be based.

CHAPTER III

BACON CURING

By LOUDON MACQUEEN DOUGLAS, F.R.S.E.

HISTORICAL

The art of bacon curing dates back to great antiquity, and swine husbandry seems to have been one of the principal pursuits in connection with agriculture from the earliest times. This may be inferred from the fact that in the time of Moses, it was considered necessary to make laws prohibiting the use of pork as food, and although the reasons for these enactments have long since passed away, there is still a prejudice amongst the Jews, and for that matter, amongst other nations, against the use of pork as being unclean. In classic times swine husbandry flourished amongst the Greeks and Romans, and swine's flesh formed part of many of the sumptuous dishes served up to the epicures of those early days. One of the earliest writers on agriculture, Palladius, who lived in the fourth century, wrote a book entitled *De Re Rustica*, which became the textbook of agriculture throughout the Middle Ages, that long and dark period of human history which lasted from the end of the fifth century to the fifteenth, and during which the progress of the arts and sciences was stagnant. About 1420 a learned monk translated Palladius into English, choosing the poetic form in preference to prose, and amongst the quaint instructions on agriculture throughout the book, none are more interesting than those referring to Swine Husbandry under the title of *De Educatione Porcorum*.¹ Early English writers of agriculture have also devoted considerable attention to the subject, such as Fitzherbert (1523), Thomas Tusser (1573), Gervase Markham (1616), Leonard Mascall (1662), Edward Lisle (1693), John Mills (1776), George Culley (1776); but the references to bacon curing as an art are not frequent, it having been the custom merely to salt the flitches of bacon when it was desired to keep them, without any other special preparation.

¹ *Palladius on Husbandry*—Early English Text Society.

Of bacon curing as an organized industry we have very scanty records, and there is no complete treatise on the subject before that of Robert Henderson,¹ who may be said to have been the forerunner of the present-day practice, and whose quaint but practical methods are summed up in the following quotation from his book:—

“I practised for many years the custom of carting my flitches and hams through the country to farm-houses, and used to hang them in their chimneys and other parts of the house to dry, some seasons to the amount of 500 carcasses. This plan I soon found was attended with a number of inconveniences, having to take along with the bacon pieces of timber, to fix up in the different houses, for the purpose of hanging the flitches and hams. For several days after they were hung up, they poured down salt and brine upon the women’s caps, and now and then a ham would fall down and break a spinning wheel, or knock down some of the children; which obliged me to purchase a few ribbons, tobacco, &c., to make up peace. But there was a still greater disadvantage attending this mode; the bacon was obliged to hang until an order came for it to be sent off, which being at the end of two or three months, and often longer, the meat was overdried in most places, and consequently lost a good deal of weight. This method is practised at this day in Dumfriesshire. People in general are so partial to old customs, that it is nearly impossible to remove them.

“About twenty years ago, to prevent these disadvantages, I contrived a small smoke-house, of a very simple construction. It is about 12 feet square, and the walls about 7 feet high. One of these parts requires six joists across, one close to each wall, the other four laid asunder at proper distances. To receive five rows of flitches, they must be laid on the top of the wall. A piece of wood, strong enough to bear the weight of one flitch of bacon, must be fixed across the belly end of the flitch by two strings, as the neck end must hang downwards. The piece of wood must be longer than the flitch is wide, so that each end may rest upon a beam. They may be put so near to each other as not to touch. The width of it will hold 24 flitches in a row, and there will be five rows, which will contain 120 flitches. As many hams may be hung at the same time above the flitches, contrived in the best manner one can. The lower end of the flitches will be within 2½ or 3 feet of the floor, which must be covered 5 or 6 inches

¹ *A Treatise on the Breeding of Swine and the Curing of Bacon*, by Robert Henderson farmer, Broomhall, near Annan, 1814 (second edition)



SLAUGHTERING A PIG ON THE FARM IN THE PRIMITIVE WAY WITHOUT HAVING
PREVIOUSLY STUNNED IT

The stunning process obviates a great deal of labour and is much more humane.



thick with sawdust, which must be kindled at two different sides. It will burn, but not cause any flame to injure the bacon. The door must be kept close, and the hut must have a small hole in the roof, so that part of the smoke may ascend. That lot of bacon and hams will be ready to pack up in a hogshead to send off in eight or ten days, or a little longer, if required, with very little loss of weight. After the bacon is salted, it may lie in the salt-house as described until an order is received, then immediately hang up to dry.

"I found the smoke-house to be a great saving, not only in the expense and trouble of employing men to cart and hang it through the country, but it did not lose nearly so much weight by this process."

Although the foregoing interesting account of early bacon-curing methods would seem to indicate that the industry was being organized at the beginning of the nineteenth century, it must be remembered that on the farms and in the manor houses throughout the country, bacon and ham curing was usually carried out in the autumn, and the flitches and hams hung up in the kitchen after being thoroughly salted and dried. This practice obtains, with certain modifications, in many farms throughout the north of England, especially in Yorkshire, Westmorland, and Cumberland, to the present day, and instead of the practice dying out and giving way before the organization of bacon factories, there is every sign that bacon curing on the farm is being resorted to all over the United Kingdom.

It is curious to find in some of the old farm-houses that the bacon-curing loft formed an essential part of the building, and the principal reason for the wide-spreading chimneys which occur in many places was that the bacon might be hung up within them for smoking after being cured, and the practice then as now, was to use oak-wood sawdust or bark for smoking purposes.¹ At the present day the farms are being fitted with buildings for bacon curing and the handling of pig products, and on some farms, more especially in the south of England, small bacon factories are being erected complete in themselves with a view to utilizing not only the pigs on the farms concerned, but from the surrounding farms as well.

Bacon curing as we know it at the present day, namely, as a highly-organized industry, did not come into existence until about the middle of the nineteenth century, and from that time onwards bacon-curing factories have arisen, and are in existence in the different swine-breeding countries throughout the world.

¹ *Old West Surrey*, by Gertrude Jekyll.

STATISTICS

As a consequence, the pig population of the world has gradually increased, and in Europe, North and South America, Asia, Australasia, and Africa it is computed that the number of swine in existence is about one hundred millions, the greater number being in North America, where there are said to be some 50,000,000.¹ The number of swine in the United Kingdom may be taken as being about 4,000,000,² and this gives rise to a very considerable industry, which has every prospect of largely increasing in the future.

The value of the business carried on in the United Kingdom may be gathered from the following summary, which shows what is done in the existing bacon-curing factories:—

VALUE OF OUTPUT FROM BACON-CURING FACTORIES IN THE
UNITED KINGDOM³

Bacon	£5,365,000
Hams	1,658,000
Pork (salted), other than bacon and hams	31,000
Lard	1,414,000
Sausages	751,000
Heads	182,000
Sausage casings	290,000
Preserved meats (including brawn, tinned meats, &c.)	383,000
Offals	278,000
Other products	157,000
Total value	<u>£10,509,000</u>

This table is instructive in many ways, as it shows that considerable use is being made of what may be termed the residual products in modern bacon factories, and that under present-day practice little is being wasted. It is indeed upon the proper utilization of the residual products that the prosperity of a modern bacon factory depends, and, as a consequence, more and more attention is being paid to this department of the business, and men who are skilled in the various branches of the subject are eagerly sought after. Unfortunately there is an utter lack of appreciation of the value of bacon curing to agriculture in the United Kingdom,

¹ *Statistique des Superficies Cultivées de la Production Végétale et du Bétail*, Rome, 1910.

² *Agricultural Statistics*, Board of Agriculture, 1912.

³ *Census of Production*, H.M. Stationery Office, 1907.

and as a consequence there are no opportunities offered at any of our agricultural or technical colleges for obtaining a methodical education in the technique of the subject. Meantime the demand for bacon and pig products in the United Kingdom continues to increase, and the year 1913 will long be remembered as that in which the price for bacon reached a point which had never been before recorded, and a year in which there was a great scarcity of bacon and pig products throughout the whole world. The value of the bacon and pig products imported into the United Kingdom may be taken at about £25,000,000 sterling,¹ but this is a wholly inadequate supply and it is likely to be largely increased from many overseas countries in years to come.

THE BACON CURERS' PIG

The pure breeds of pigs are not of very much interest to the bacon curers except as contributing to the style of pig which is needed for bacon-curing purposes, and the study of the different breeds belongs to a different department of the subject. The bacon curer is not particular as to what breed a pig may belong, if it possesses certain points which have been summarized as follows:—

1. *Neat head*.—The pig that is very long in the head is usually narrow between the eyes, has seldom a very strong constitution, and has rather more bone than is required. On the other hand, the pig that is very short in the head is usually too fat, too heavy in the fore end, thick in the neck, and heavy in the shoulders. Neat in the head means neither too long nor too short a nose. The ears should be fairly large, soft and pliable, and should fall a little to the front without actually being lopped.

2. *Light neck and shoulder*.—The coarser parts of a side of bacon, and those which fetch the lowest price, are the neck and shoulder. The lighter these parts the better the side, and the higher the price it will make.

3. *Deep heart and well-sprung ribs*.—Pigs are usually deficient in these points, which are, perhaps, the most valuable of those here enumerated. For stock purposes breeders should, therefore, select only those animals which have these characteristics strongly developed.

4. *Thick loins*.—A pig with a good loin is almost invariably well ribbed, and has a strong constitution. From a breeder's and feeder's point of view a good loin is most essential.

5. *Stout thighs*.—This means a pig thoroughly well developed in the hams. The hams are the most important parts of the animal, and in the case of pigs killed for the ham and middle trade, the most valuable of all, provided they are not too fat.

¹ *Accounts Relating to Trade and Navigation of the United Kingdom*, December, 1912.

6. *Short legs*.—A pig that is long in the leg is nearly always flat in the ham, and lacking in plumpness.

7. *Long and silky hair*.—Good hair is an indication of strength of constitution as well as lean meat. The absence of hair generally proceeds from close breeding, and indicates a tendency to excessive fatness.

8. *A long side of moderate depth, with thick flank*.—This type of animal should be aimed at, whether thoroughbred, half-bred, or common-bred pigs are kept.¹

It may further be stated that the pig which commands the highest price is one which is well finished and not over-fat, weighing 12 stone (168 lb.) dead, or from 15½ to 16 stone alive. Such a pig ought to arrive at the weight mentioned at the age of seven months after its birth.

It must, therefore, be the aim of the farmer, whether he intends to cure bacon and make pig products himself, or supply the live pig to the factory, to conform to these conditions as nearly as possible, and to make that selection in his herd which will give him such results.

BACON CURING ON THE FARM

As we have seen, the art of bacon curing was practised on the farm long before the establishment of bacon factories, and at the present day there is much to be said for the carrying on of the practice.

Generally speaking, the same conditions would apply throughout the United Kingdom where ordinary farm buildings only are available; it would be safe only to cure in the autumn or during winter. * Certain general conditions for curing in the small way are necessary. It is first of all desirable to have a few tools which are easily obtainable.

The other equipment will consist of a large copper built in brickwork, which can be heated up for scalding purposes, or a half barrel of sufficient size to take the carcass of a bacon pig, and into which scalding water can be poured when required. There should also be a scraping bench or scuttling table upon which the carcass has to be raised after being scalded.

The pig should be dressed in a nice draughty place, a sparred shed serving the purpose very well, and when the cutting-up has to be done, this should be carried out in a clean place in which the surroundings are sweet and where there is plenty of fresh air.

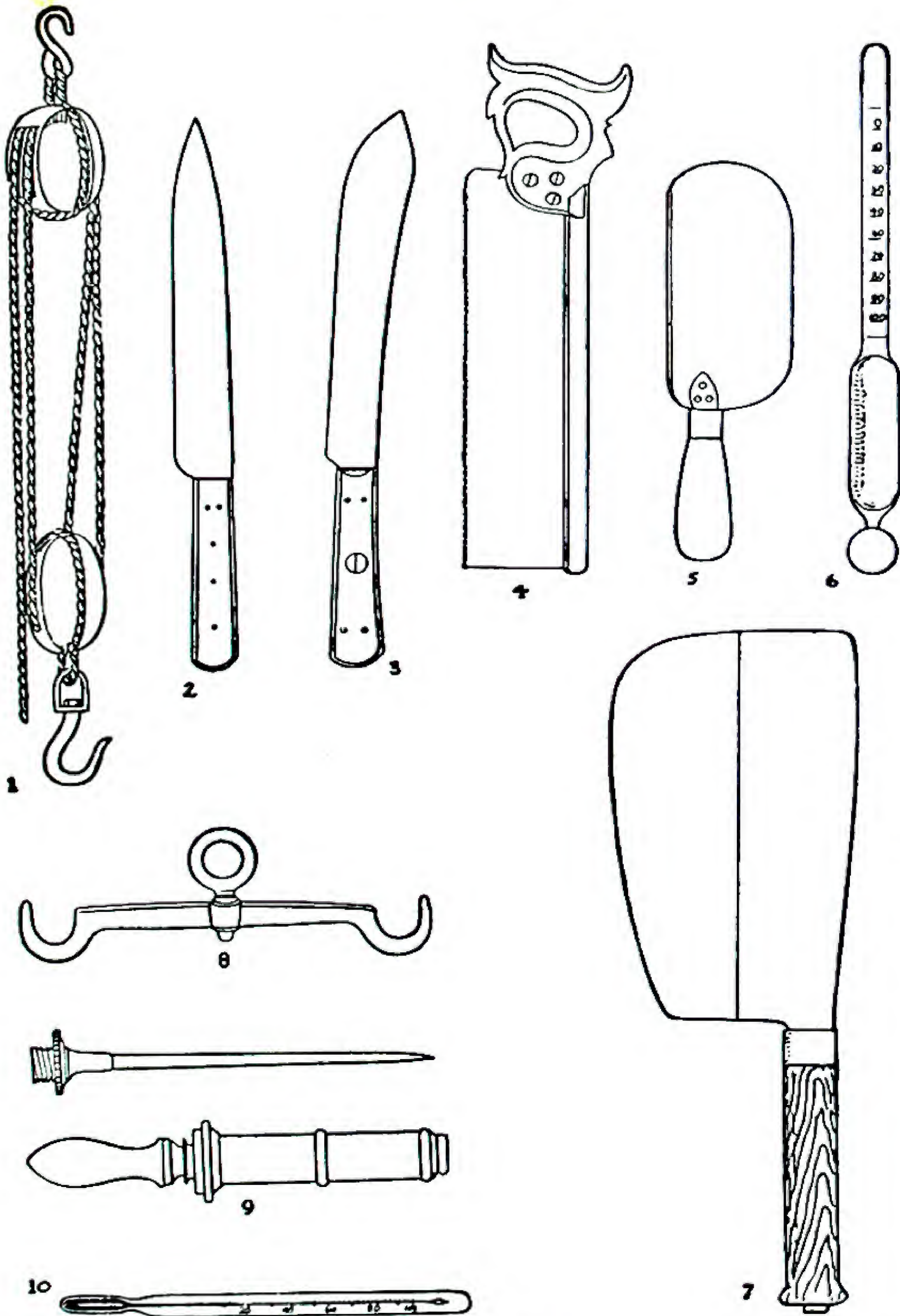
¹ *The Breeding and Feeding of Pigs*, a leaflet issued by the Department of Agriculture and Technical Education of Ireland.





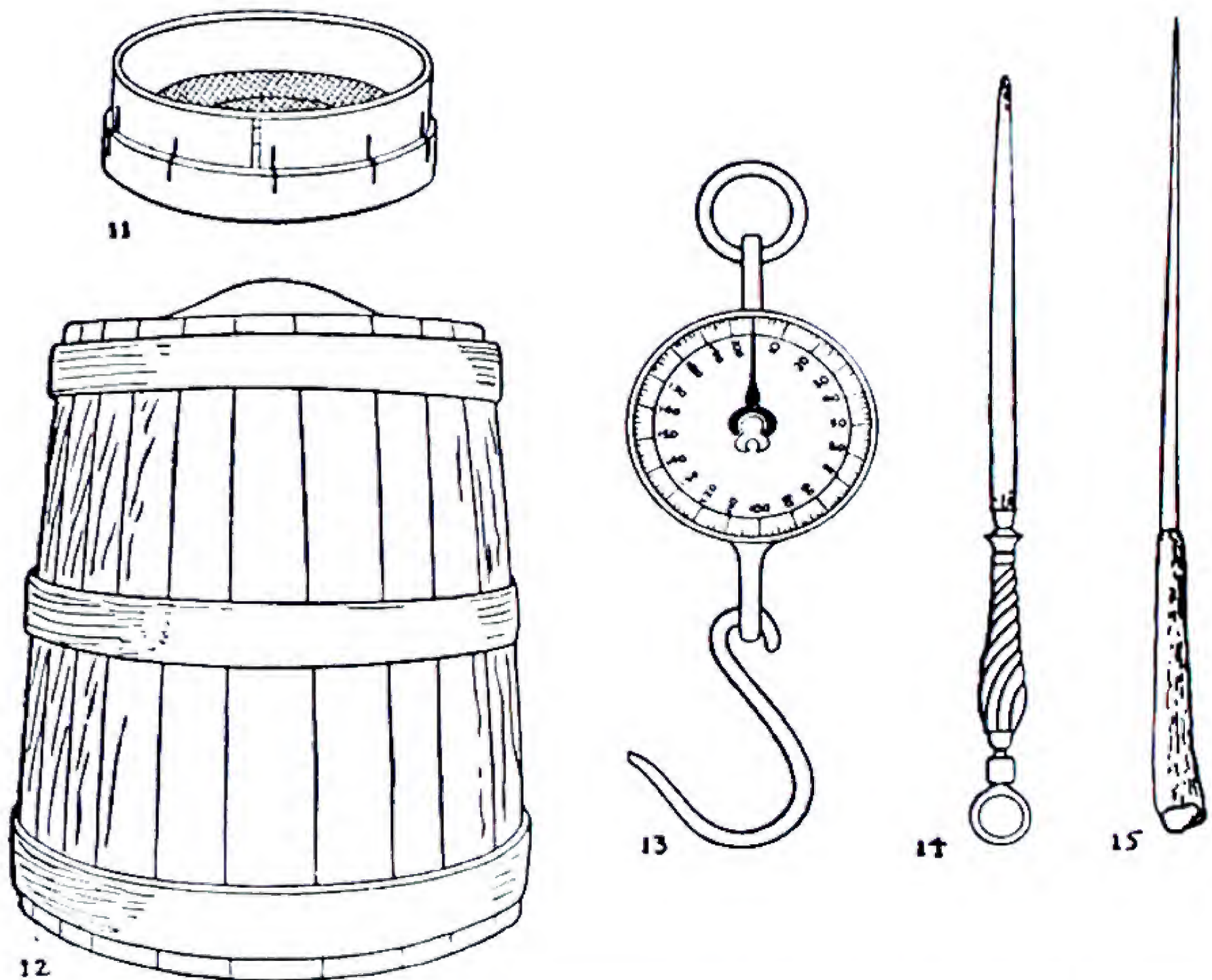
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ONE METHOD OF CUTTING UP A SCALDED PIG'S CARCASS SO AS TO UTILIZE
THE PARTS FOR HAMS, MIDDLES, AND FORE-ENDS



1, A common rope pulley block is all that is wanted for hoisting. 2, A sticking knife, which should be sharp and straight, and about 10 in. long in the blade. 3, A 10-in. shop knife is the one most commonly used for general purposes. 4, A back saw with 20-in. blade is indispensable. 5, A pig scraper of the flat type answers all purposes. 6, The salinometer is necessary for testing the strength of the pickle, which should be about 100 degrees. 7, A Smithfield cleaver of about 10 in. blade is a necessary tool. 8, Gambrels may be made of wood or galvanized iron. This one is galvanized iron, with a swivel ring; but a simpler one would do. 9, There are many kinds of pickle pump, but on the farm a small pump or syringe will be sufficient. 10, The meat-testing thermometer enables the temperature of the meat to be taken. This is very useful sometimes, as meat of a high temperature (over 50° F.) will not cure with any degree of safety.

The curing cellar should be of sufficient dimensions to take the carcasses handled without having to pile the meat the one part upon the other, and such a small room can generally be arranged on modern farms. It should be perfectly dark, but there should be a good current of air, and it should always be fresh. The walls should be plastered smooth either with cement or lime, and if there are rafters



11, The mixture of dry antiseptic and saltpetre can be put on the bacon or hams by the hand, but a more certain way of obtaining equal distribution is by means of the hair sieve. **12**, A pickling tub can be of any shape so long as it is roomy enough. Those made of oak or other hard wood last a long time. **13**, A common spring balance will answer all purposes. One to weigh up to 250 lb. will be best. **14**, A steel is a very useful tool. It enables a keen edge to be put on the knives. **15**, The ham and bacon trier is very useful. By inserting it into the cured meat and smelling it after it is withdrawn, it will be easy to tell if the meat is tainted or not. After withdrawing the trier, always close the opening made, with the finger.

overhead these should be boarded over and the interior limewashed. The door should fit tightly, and the floor should consist of either flagstones or concrete with a smooth surface; in either case the floor should slope in one direction, so that any pickle which is set free may run away without hindrance, and it can be caught in a little sump which may be made in one of the corners. In such a place it will be well to cure either the bacon or the hams in pickle. That is to say, the meats should be laid down in clean-washed half-barrels and allowed to make their own pickle.

The process of handling the carcass in a small way on the farm, under the conditions indicated, is as follows: The bacon pig is first of all knocked on the head with a mallet so as to render it unconscious, or a humane slaughtering instrument in the shape of a captive bolt pistol may be used. This is by far the most effective, as the animal is at once rendered insensible, and is more easily handled. The carcass is then hoisted to a branch of a tree or to a ladder, placed diagonally against the wall of a barn or any other convenient spot, or a tripod of poles may be formed and the carcass suspended from the centre. In either case a knife of about 8 in. long is inserted in the throat, the point of the knife being directed towards the root of the tail and in line with the backbone. The incision is made quickly so that the large blood-vessels are instantly severed, and in a very short time the whole of the blood flows out. The method is humane throughout, and is one which in the small way involves the least trouble. As soon as the carcass is free from blood it will be ready to handle, either for scalded or for singed bacon. In factories the singeing is always performed by means of a singeing apparatus or singeing furnace, but as such would be an expensive institution on the farm, a substitute can be found by spreading out some coarse wheat or barley straw, upon which the carcass is laid; it is then covered up with straw and set fire to, or the carcass may be stretched on a pole and in this way completely singed with straw, by being turned round in the fire. As soon as the singeing is completed the carcass is again hung in either of the ways indicated and is washed with cold water until quite cool, after which it is ready to be eviscerated and dressed.

In cases where a carcass is not singed, but merely scalded, it is dropped into a tank or half-barrel of scalding water at a temperature of about 180° F., or, if it happens to be a small pig, the temperature should be rather less, say about 160° F. It is turned round in this scalding water until the hair comes away easily in the hand, and it is then suspended by the sinews of the hind legs, which have been exposed, and under which a gambrel or spreader has been placed. From this point onwards the methods in handling the singed and scalded carcasses are identical. When the carcass has been outwardly washed and scraped clean, an incision is made with the knife between the aitch bones, and this is continued right down to the apex of the lower jaw. The aitch bones are then severed, the bladder and organs of gestation are taken out, and the other intestinal offal, including the stomach and fat, are removed. The breastbone is cut through, and the skirt or dia-

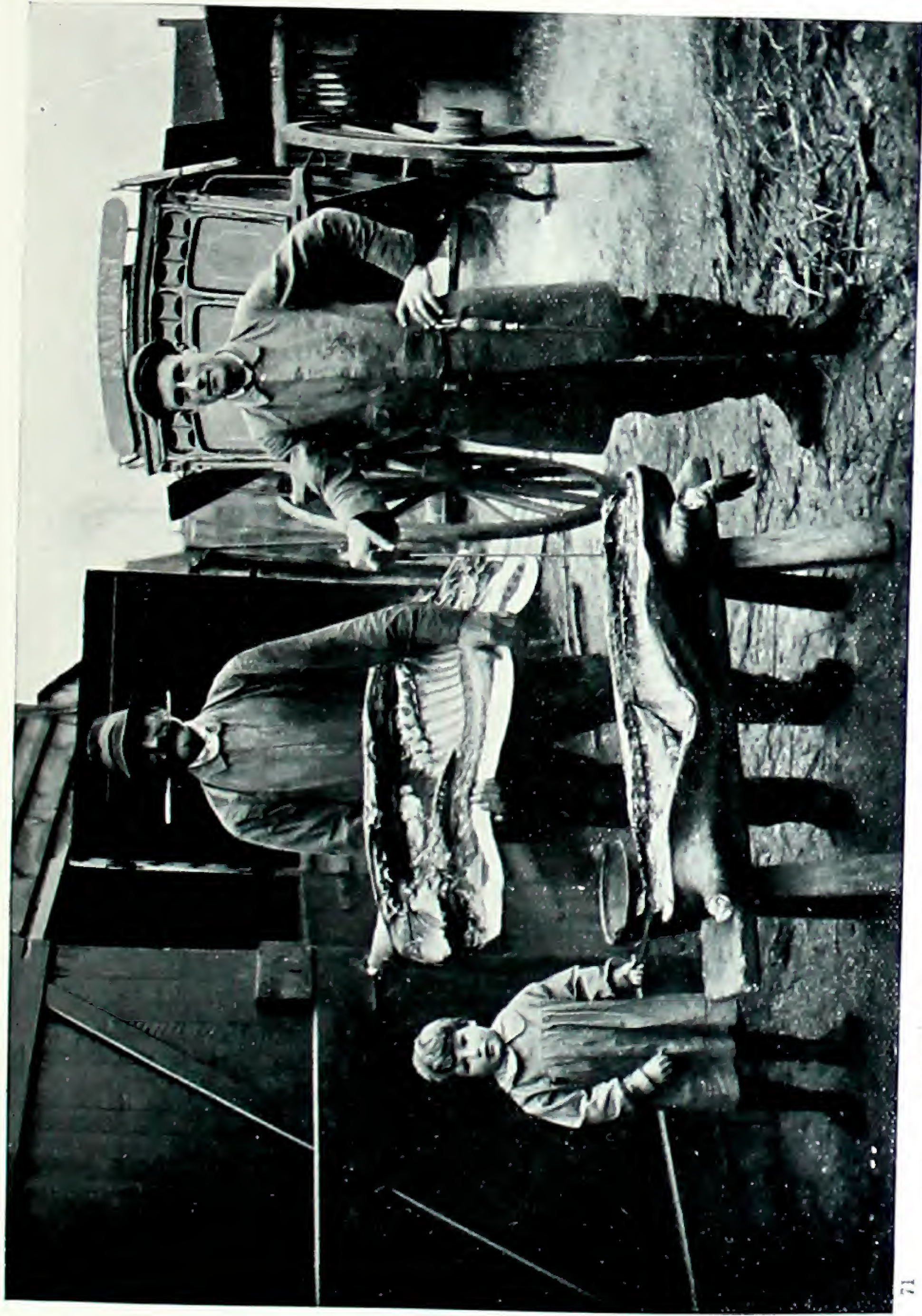
phragm is cut right round, and the heart and skirt are cut from the lungs and thrown into cold water to be cleansed. The lungs and windpipe are then removed, being cut off at the base of the tongue, the latter being left in the head. All the offal referred to has a particular value, especially on a farm, and nothing should be wasted. The intestines should be cleansed and scraped with a blunt knife and put in salt, so as to be used for sausage-making. The principal organs of the body, namely the liver, tongue, and heart, can either be used in the fresh state or preserved, or if a small sausage machine is available, they may be chopped up and used for sausage-making; but there are other methods by which they may be rendered into appetizing delicacies should that be so desired. The stomach is used as it is after being cleansed and after being thoroughly cooked; and sometimes the intestines after being thoroughly cleansed are cooked along with the stomach and in that way are known as "chitterlings". The lard is then taken out and hung up to harden, after which it may be cut down into small pieces and rendered for domestic use.

There are different ways of cutting up a carcass. Where Wiltshire bacon is wanted, the singed carcass will be cut up into two sides, the head and feet being removed. The two sides are separated by removing the vertebral column or backbone, which is done by making an incision right down the back, so as to expose one side of the backbone. Another incision is made on the other side of the backbone, and it is freed from the carcass by means of a chopper. In that way the two sides are left separate, and they may be allowed to hang up overnight to cool. In the morning the meat will be quite hard, and the sides may then be trimmed, the sharp corners of the ribs being sawn off and the blade bone pulled out, the steaks or undercut taken away, and the neck bone and aitch bones are cut loose. The spare rib and breastbones are taken away and the sides trimmed generally.

In this condition the side is ready for curing as Wiltshire bacon. Before proceeding to the curing of Wiltshire bacon, it will be necessary to make a curing pickle, which is made up as follows:—

- 14 lb. salt.
- 1½ „ saltpetre.
- 1½ „ dry antiseptic (boron).
- 1½ „ cane sugar.
- 32 „ or 3½ gall. of water.

The total quantity should be about 5 gall., and as it is desirable that this pickle should be perfectly sterile, it should be boiled



WILTSHIRE SIDES OF BACON CURED ON THE FARM IN AN OUTHOUSE

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A MODERN FARMERS' CO-OPERATIVE BACON FACTORY IN IRELAND

It has a capacity of 750 pigs per week.

and skimmed till quite clear. The pickle should test 95° to 100° on the Douglas salinometer, and if it is weaker than that, salt should be added so as to bring it up to the desired strength. When the pickle is made it should be kept in a clean receptacle, such as a barrel or earthenware vessel, which should be kept perfectly clean and cool. The best place therefore for it is in the cellar. The meat is cured by first of all filling the pocket-hole in the shoulder with a little muslin bag containing salt and about 5 per cent of saltpetre and dry antiseptic added. All the fleshy parts of the meat should be pumped with the pickle already referred to, giving about fourteen sticks with the needle, while the pump used should be well regulated and the pressure maintained at about 40 lb. to the square inch. The sides should then be sprinkled with an equal mixture of saltpetre and dry antiseptic, and laid on a bed of salt in the curing room. Salt should be sprinkled over the sides so as to cover the curing material already applied, and in this position the sides will cure to a "mild" cure in about fourteen days. If it is necessary to pile the sides on the top of one another for want of room, then the belly parts should be kept up by means of oak staves, and in this way the ribs form saucers and collect the pickle which is formed by the salt and the juices of the meat. In the small way, however, on a farm, it will hardly be necessary to pile the bacon. For farm purposes mild-cured bacon is not so much wanted. It will, therefore, be desirable to continue the curing beyond fourteen days, and in fact on some farms the curing is extended to twenty-eight days, and in the meantime the sides have been taken up and turned, and a fresh supply of salt added at the end of each seventh day. It will be clearly understood, of course, that this bacon will be salty, but it will keep for an indefinite period, and may be taken out of the salt, washed in cold water and laid aside, rind upwards, so as to drain. In two or three days the sides may be taken up and hung up in a dark, cool, dry loft, so as to dry, and if the bacon is wanted in the smoked state it may then be smoked in a rough-and-ready way by suspending it in a barrel raised on some loose bricks above the ground. Some oak sawdust is used as smoking material, and this is lighted under the barrel and allowed to smoulder and give off smoke, care being taken to prevent the lower part of the side from coming near the heat of the sawdust, and this can easily be done by placing a piece of iron over the sawdust so as to spread out the smoke and prevent the heat rising in a vertical line. The old-fashioned way was to hang the bacon up in the kitchen, but this is quite a mistake, as in that way it gets exposed to flies, which play great havoc with it; and the temperature

also of the kitchen varies so much, that very often "rusty" bacon is thus produced. The best place to keep the sides is in a cool loft, perfectly dry, clean and dark, and where the temperature does not vary very much.

Scalded sides may be cured in different ways. The hams may be removed and cured separately, and the three-quarter side cured by itself, or the carcass may be cut up into different sections so that the parts can be cured as hams, middles, and fore-ends. The process of curing which is generally described as the *wet cure*, is utilized very often for the curing of such meats. The meats are pumped with the pickle already mentioned, and are then laid in tanks or tubs, and covered over with an equal mixture of saltpetre and dry antiseptic, on the top of which is sprinkled a layer of salt. This very speedily makes a brine of itself, but it is no uncommon thing to use the pickle and immerse the pieces of meat in it, holding them down by boards upon which weights have been placed. This is necessary, as the meat is lighter than the curing pickle and will float on the surface. It is obvious that the length of time taken to complete the curing must depend upon the period during which the meats have to be kept, as mild-cured meats have to be consumed at once, whereas heavily salted meats may be kept for many months.

The curing of heads, houghs, tongues, feet, &c., is carried out with the pickle already mentioned, and the time necessary for curing may extend from a few days to fourteen days or so; it is altogether a matter of taste and convenience. Ham-curing on the farm follows along somewhat similar lines to the curing of bacon, and may either be conducted by the dry method or by the wet cure. If it is desired to make dry-cured hams, then it is advisable first of all to plunge the hams into a pickle and allow them to remain overnight, so that they may be purged. The blood which accumulates in the blood vein may be squeezed out and the dry curing begun. Hams are not, as a rule, pumped, although it is sometimes desirable to make one incision of the needle down the blood vein, seeing that the opening thus made is carefully closed up immediately afterwards. The hams are laid on the floor, shank downwards, and covered over with an equal mixture of dry antiseptic and saltpetre, and a heavy layer of salt should be placed on the exposed cut surfaces, which should be approximately level. The method of curing the ham depends upon the length of time it has to be kept and the weight of the ham to start with. A very good rule to follow is to allow three days clear, and then allow one day for curing every pound weight of meat for mild-cured hams.

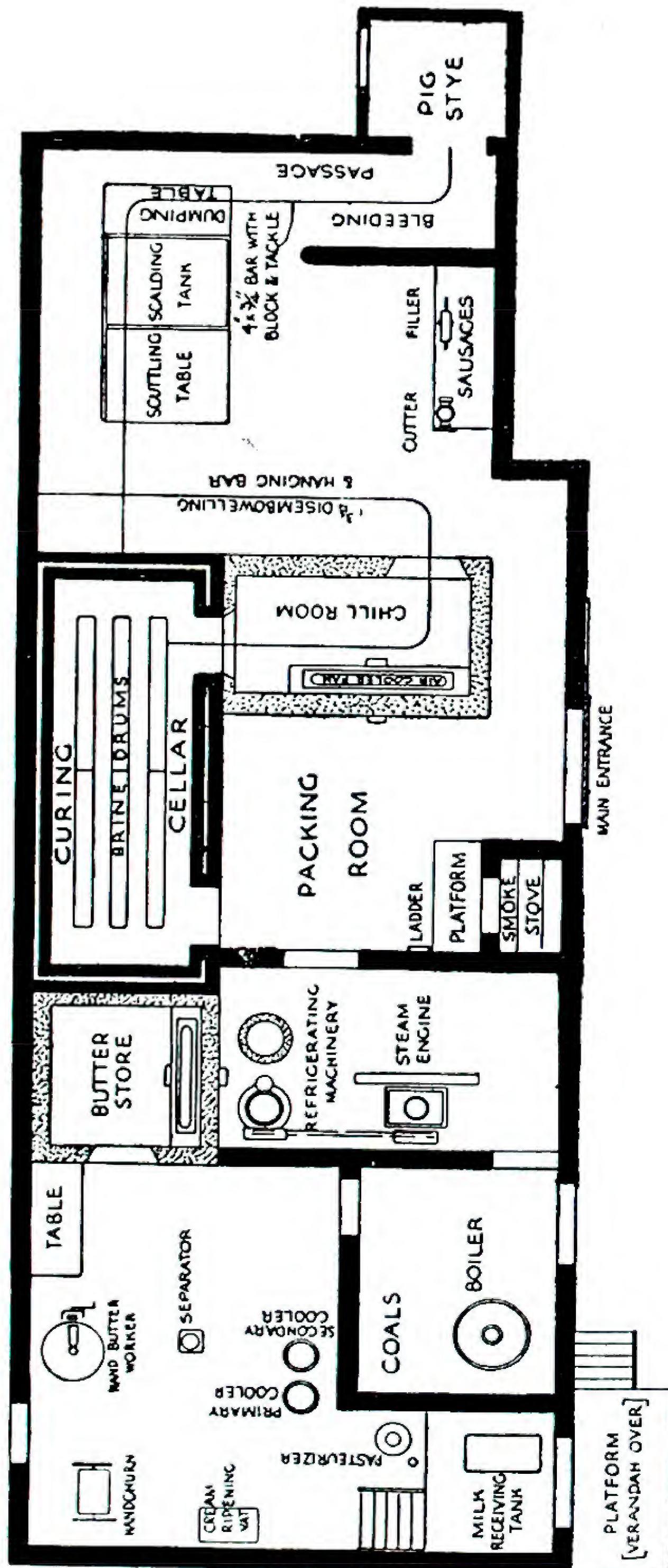


Fig 1.—General Arrangement of Bacon Factory for Handling Five to Ten Pigs per Week combined with small Creamery

For salt-cured hams, double the period of time for the curing. If the hams are to be sold as "winter cured", they require to be hung up in the cellar until blue mould accumulates over the surfaces, and this indication of decomposition is looked upon as imparting a piquant flavour. On the other hand, if the hams have to be sold in the smoked state, they can be smoked in a barrel in the manner already described for bacon. Sausages, black puddings, brawns, lard, &c., are all products which can be made in the small way, and there is no difficulty in following the recipes which are available in connection with this part of the subject.

Bacon curing on the farm may be a much more highly developed affair than is indicated in the foregoing description, and there are many examples in the United Kingdom of special buildings and equipment being provided on farms for bacon-curing purposes. Some of these are in connection with creameries, and it is found that this is an exceedingly profitable and convenient combination. A factory to handle five to ten pigs per week if combined with a creamery (see fig. 1) is a comparatively simple affair, the buildings covering a space of about 60 ft. by 22 ft. over all, and the equipment is of a very simple character. There is a small curing cellar, cooled by a refrigerating machine which is common to the creamery and the bacon factory, and the auxiliary departments are complete. In the building is a small smoke stove, so that a few pigs can be easily handled in such an establishment. A more elaborate affair is a factory to deal with from thirty to fifty pigs per week (see fig. 2), and which combines within itself most of the requirements of a larger factory. A factory of this sort with a veranda round, such as is shown, is very suitable for the tropics or a warm climate. The cost of the buildings would be approximately £500, and the total cost of equipment would be about £530. The area covered, including the veranda, is 36 ft. 6 in. long, and the width of the main buildings with the machine room, and inclusive of the veranda, is 16 ft. 6 in. On such an area it will be observed that there are pig pens, abattoir equipment, chill-room, curing-cellar, lard and sausage rooms, machinery room, ice-tank, packing-room, store and smoke-stove, so that the whole arrangement makes an extremely compact concern.

In recent years quite a considerable development has taken place in connection with bacon curing on the farm, and in Devonshire and Dorsetshire there are farm factories up to a working capacity of seventy-five pigs per week: forming useful and profitable adjuncts to the business of dairying.

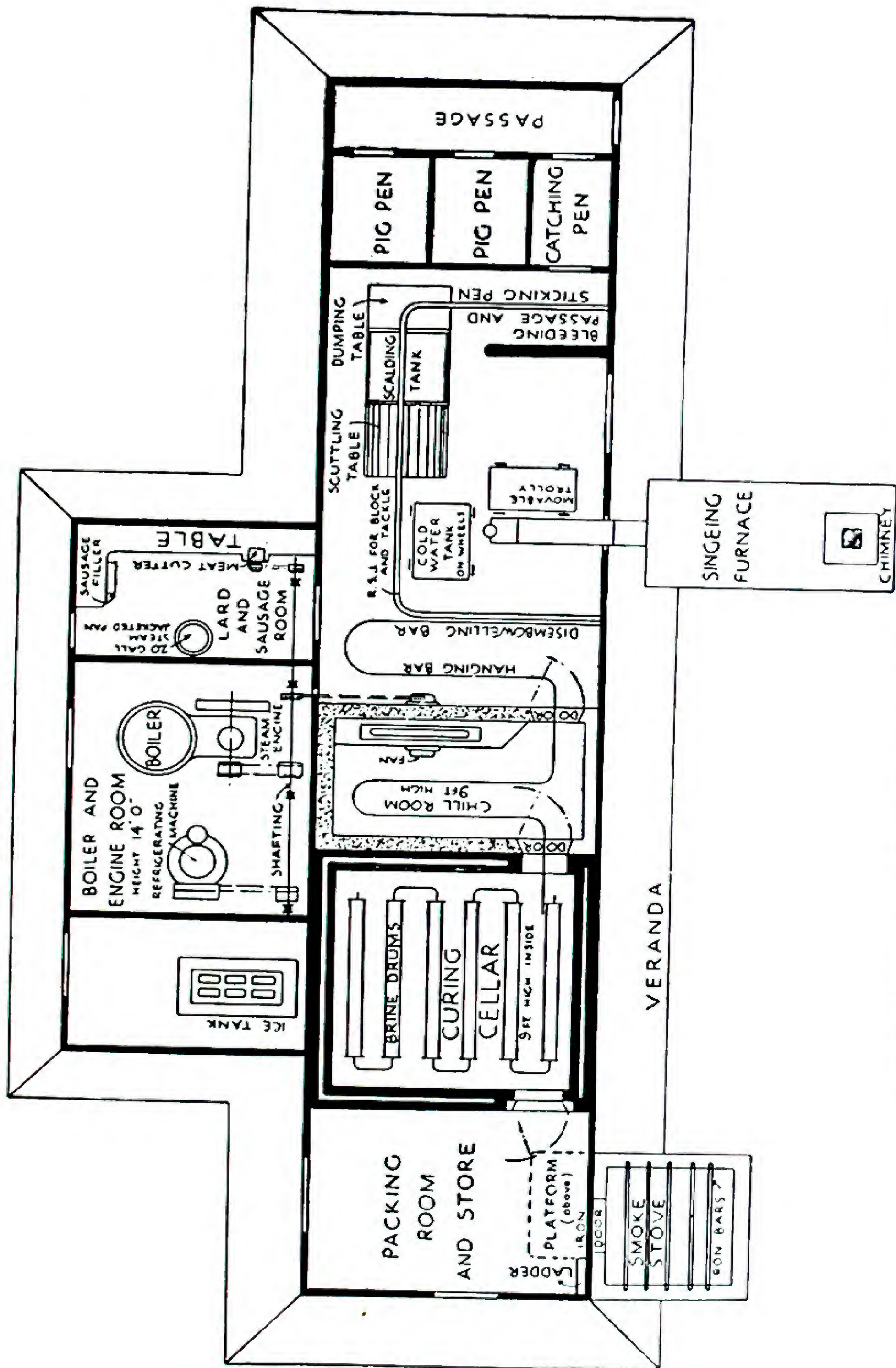


Fig. 2.—Arrangement of Bacon Factory to deal with Thirty to Fifty Pigs per Week

CO-OPERATIVE BACON CURING

There are two ways of organizing bacon curing on the large scale, namely, by the formation of Joint-stock Companies, or by the organization of Farmers' Co-operative Bacon Factories. The difference between the two systems is that whereas a joint-stock company issues shares to any extent, which bear a profit according to what is earned, a co-operative bacon factory is registered under the Friendly Societies Acts of 1893-5, and is governed by a specific set of rules approved by the Registrar under the Act. The most important of these rules are those referring to the shares, which are generally of One Pound (£1) value, but no member is allowed to have a greater holding than £200, and the maximum dividend payable cannot exceed 5 per cent. Profits over and above that amount may be divided as bonuses amongst the members of the society *pro rata* according to the number of pigs supplied, but the members are generally under an obligation, with a penalty attached, to supply all their bacon pigs to the bacon factory for a period of years from its commencement. Briefly speaking, these are the principal rules which govern a co-operative bacon factory, and they are indicated here as being those under which the great Danish bacon-curing industry has, for the most part, been built up. A number of factories running on the same lines have been started in the United Kingdom, and time will show whether this principle can also be successfully applied by British agriculturists.

The conduct of the bacon factories either as joint-stock companies or as co-operative bacon-curing establishments is precisely the same, and success principally depends upon the skill of the manager and his staff.

BACON CURING IN THE FACTORY

As we have seen, organized bacon curing is a comparatively modern affair, and the literature in connection with the subject is somewhat scanty, but the whole business has been reduced to a scientific basis, and the processes which at one time were managed by rule of thumb are now well understood. The size of bacon factory which seems to be generally profitable is one capable of handling from 500 to 750 pigs per week, but there are a few in the United Kingdom which handle 2000 and upwards per week. British methods of curing are totally different from those prevailing in the greatest pig country of the world, namely, the United

States of America, but they are pretty generally adopted in the British Colonies, and wherever new factories are being erected in overseas countries which have not hitherto specialized in bacon curing. The methods, therefore, to be described, must be understood to be those of British practice, as distinguished from what prevails in Denmark or the United States of America, and it will be convenient, so as to understand the process of curing, if we follow the operations in a modern British factory.

The pigs are first of all received at the receiving shed, and after being weighed over the live-weight scale, are driven to the pigsties attached to the factory, where they are generally allowed to rest for some little time to allay any excitement due to a long journey. The weight on the live-weight scale is recorded on a ticket, and the factory is prepared to pay for the animals by live weight, the other alternative being "dead" weight, and the meaning of which we shall see later. When the slaughtering takes place, the pigs are driven into a catching-pen, where, in the most modern factories, they are at once rendered unconscious, either by the pole-axe or by means of a captive bolt-pistol, such as is supplied by the Royal Society for the Prevention of Cruelty to Animals, of London. The bolt of the captive bolt-pistol pierces the skull and lacerates the brain, thus rendering the animal instantaneously unconscious. It is then shackled by means of a shackling chain which is passed over one of the hind feet, and quickly elevated and suspended from an overhead bar, along which it is pushed in front of the slaughterman, who at once inserts a knife so as to sever the large blood-vessels of the throat, pushing the carcass from him along a bleeding bar which is in a confined passage. The blood quickly flows out, and in less than a minute the still carcass is left. In a factory where 500 to 750 pigs per week are handled, the bleeding passage generally has accommodation for from fifty to sixty pigs, and the passage itself is usually lined with white tiles, the floor being carefully cemented so that cleansing is easily performed. The bulk of the blood is caught in a receptacle in this passage, and is removed every day. It is usually sold for conversion into fertilizers, but there are a few factories where a drying apparatus is installed so that dried blood is made on the spot.

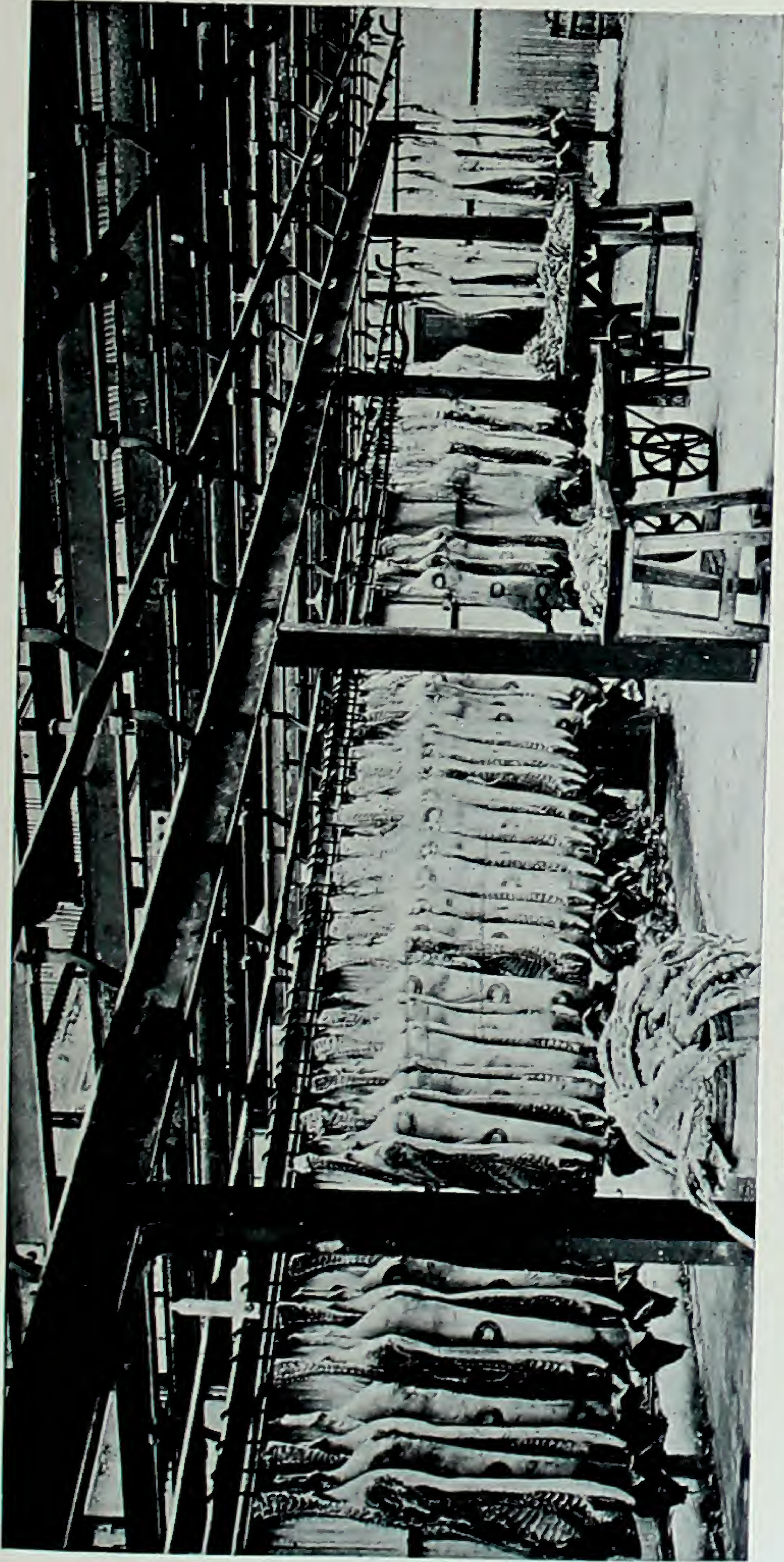
The carcasses are dropped one by one on to a dumping-table at the end of the scalding-vat, and are either dropped into this vat to be scalded or are passed on over the vat to a singeing furnace. There is no fixed practice in this matter, as some curers believe in scalding bacon pigs and partially removing the hair before they

are singed, while others follow the practice of singeing the pigs with all the hair on. Presuming that it is Wiltshire sides of bacon that we have in view, then the carcasses will be slung one by one through the vertical singeing furnace heated with coal, or a gas or oil furnace as the case may be, the object being the same—namely, to remove the hair by burning, and at the same time cauterize the skin of the carcass. The operation of singeing occupies about a quarter of a minute, after which the carcass is lowered on to a bar and dropped into a cold-water bath or suspended in a stream of cold water, which may be circulated over the carcasses by means of a rotary pump. The carcasses are then pushed on to the disembowelling-bar, where they are scraped clean and washed by means of overhead water-sprays.

In a large bacon factory it is frequently necessary to prepare different kinds of pig meat, and it is not always essential to singe the carcass, which is a special feature of Wiltshire bacon. Hence some carcasses are scalded without being singed, and they arrive at the disembowelling-bar to be outwardly washed and dressed in the same way as the singed carcasses. The hair, which forms a by-product of scalded pigs, is a commodity of considerable value, and is used for many industrial purposes, including the stuffing of furniture. The temperature at which scalding takes place is about 180° F. for bacon pigs, and the carcasses are kept in the scalding-tank until the hair comes away easily in the hand. It may be removed by means of hand-scrapers, or, where the business warrants it, mechanical scrapers are in use.

The disembowelling takes place by making one straight long cut between the hams, down the middle line to the neck; the next cut separates the aitch bones, and the bladder and the internal organs of gestation are taken out. After this the crown-end is cut out, and the fat gut loosened all along the inside of the back. The rest of the intestinal offal, consisting of the intestines, stomach, and fat, are all pulled out at once, and are immediately removed to the offal room, where they are pulled asunder. All the fat is removed and the intestines are placed in water at once, the stomach being placed in a separate receptacle to accumulate, as they are generally sold for the making of pepsin. The intestines are cleansed and scraped with a blunt knife and used for sausage-making; whereas the liver, kidneys, &c., are sold separately for consumption as they are, or for sausage-making, as the case may be.

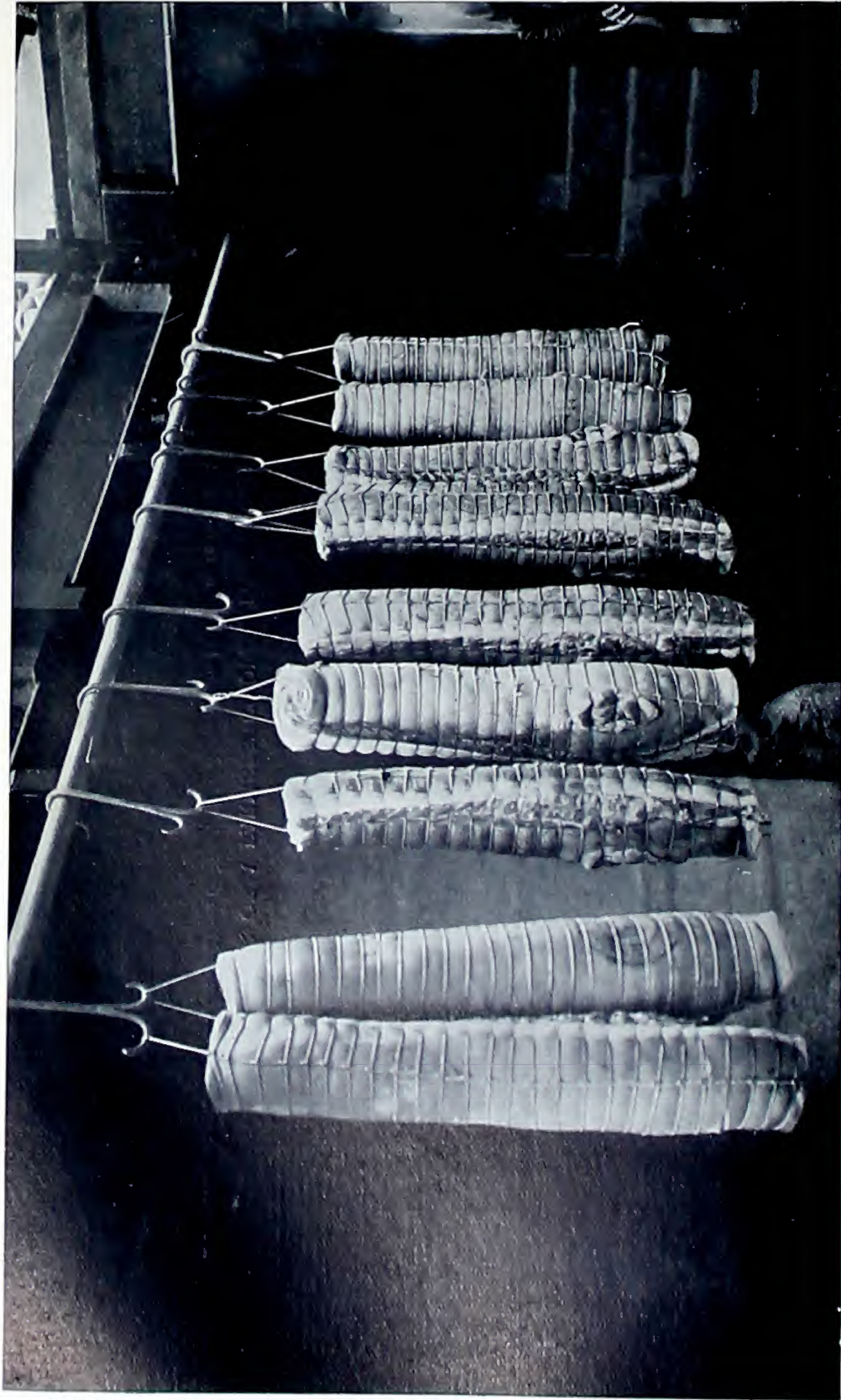
When the intestinal offal has been removed, the breastbone is at once cut down or sawn through, and the skirt is taken out as close to the flake lard as possible; the heart is cut away from the



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INTERIOR OF A FARMERS' CO-OPERATIVE BACON FACTORY

The carcasses are split down and the backbone removed. The sides are now hanging up so as to cool, previous to being placed in the chill room.



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ROLLED BACON MADE FROM THREE-QUARTER SIDES, THE HAMS HAVING BEEN REMOVED
AND SEPARATELY DEALT WITH

lungs and thrown into tubs of running water so as to be cleansed; the lungs and air-pipe are drawn through the open breastbones and cut off at the base of the tongue. The flake lard is then removed and the carcass severed in two by cutting down the back and removing the backbone; a straight cut is made from the root of the tail right down the back of the neck, and similarly on the other side of the bone a cut is made, care being taken not to leave any meat on the bones. At this point the carcass is weighed, including the flake lard, and in some factories 3 to 4 lb. are deducted for the loss of weight which will ensue in the cooling of the carcass, and this constitutes the "dead weight", upon which so many factories pay for their supplies. The average loss between the live weight of the carcass and the dead weight is about 25 per cent. As soon as the weighing takes place the fore legs are cramped back on to the sides, and this is generally done either by means of hooks or strings. From the weighing scale the carcass is then thrust into the hanging-house, where it is further disembowelled, the backbone being completely taken out, and generally, the flake lard is taken out at this point also. The heads are cut off entirely, and the split-up carcasses are thus allowed to cool and the superfluous animal heat permitted to dissipate. The hanging-house is a large airy place, with plenty of ventilation and plenty of light. The carcasses hang in the hanging-house usually until the next day, when the sides are taken down singly and trimmed in what is known as the Wiltshire manner. The sides are placed one by one on tables, where they are scraped, so that all superfluous fat is removed, and the neck is trimmed clean, as well as the other parts of the sides. The steaks or undercut are cut out, and the fore feet are either cut off or sawn off at the knee joint. The neck bones are cut loose as close to the neck as possible, the spare and breastbone being cut away with the neck bone. The sharp point of the ribs exposed are also sawn off, and the large blood vein in the neck is removed. The blade bone, which is in the shoulder of each side, is then loosened, and, by means of a clip and shoulder-belt is pulled out, while the hands guide a chisel over the surface of the bone so as to prevent the tearing away of any of the meat. The opening caused by the blade bone being removed is known as the "pocket-hole". The trimming of the side is quite an art in itself, and has to be learned in the factory; but it may be said, generally, that the idea is to make the side as presentable and symmetrical to the eye as possible, without cutting off too much of the meat. The trimmed sides are hung up in the chill-room, which is kept at a temperature of 38° F., and in which there is a circulation

of cold, dry air. The sides are kept in the chill-room until it is ascertained by means of a pocket thermometer that the gammon has cooled down to about 42° F., after which the sides are taken one by one into the cellar. They may either be carried, or pushed along track-bars, which is the modern method. The "cellars" have obtained that name because at one time it was thought necessary to have them underground. Since the introduction of refrigeration, however, this has not been found necessary, and modern "cellars" are on the ground level; the name, however, remains.

The process of salting the meats is one of *osmosis* or diffusion. The salt diffuses into the interior of the meat, while the soluble albuminoids pass out into the pickle. This would apply more especially where meat is cured on the dry-curing principle, but Wiltshire bacon is generally cured by injecting first of all a pickle of recognized standard into the meat. This pickle is made up as follows:—

100 lb. salt.
10 „ saltpetre.
10 „ cane sugar.
10 „ dry antiseptic.

These quantities are *made up to* 40 gall., or, roughly speaking, 400 lb. in all, with water, and this is boiled until clear. In some factories large stores of pickle are prepared at one time and kept in tanks opening from the cellar, so that there is always uniformity of temperature, but pickling-pumps are for the most part portable. In some cellars there is a fixed pump with a delivery-pipe connected up to the pickle store-tank, and at intervals there are nozzles to which a flexible hose may be attached, and so the bacon is pumped at any point. The pumping consists in sticking a long needle, with perforations towards the point, into the sides of bacon at some fourteen places; the pressure generally used is about 40 lb. to the square inch, and the needle is not allowed to remain more than two or three seconds at one point.

The process in the curing cellar is as follows: The sides are first of all laid on a bench and the hind feet are sawn off at the hough joint. A muslin bag containing a mixture of salt, 5 per cent of saltpetre, and 5 per cent dry antiseptic is inserted in the "pocket-hole", then the pumping of the sides is proceeded with. A soft brush is used to wash each side with some pickle, and an equal mixture of dry antiseptic and saltpetre is dusted all over, after which the side is laid down and covered over with a light layer of salt. The sides are not usually touched for from twelve

to fourteen days, according to the markets for which they are intended, and the temperature of the cellar is kept at about 42° to 45° F. Wiltshire bacon is generally wanted mild, and on an average will not be kept in the cellar longer than fourteen days. Various markets require different cures or different states of saltiness, hence it is no uncommon thing for bacon to be taken out in six days, or kept in the cellar twenty-one days. At the end of the time prescribed, the sides are taken up from the cellar and dumped on to a sparred table, so as to remove the excess of salt. The little bags are taken out of the "pocket-holes", and the sides are then washed in cold water to which a little antiseptic has been added. They are dried with wrappers, so that all slime is removed, and in this state the product is complete as green bacon. There are different selections of bacon on the market according to the weight, and these all fetch different prices.

The smoking of bacon is sometimes carried on in factories, but is also very largely a separate industry, more especially in London, Manchester, and Liverpool, smoke-stoves on a large scale being carried on by firms who cater for this class of business alone. The smoking consists of dusting over the sides with some peameal and hanging them up in large smoke-stoves, where the smoke arises from smouldering oak or hard-wood sawdust. The ordinary smoking takes places in about three days, but that also varies according to taste.

THE CURING OF HAMS

The curing of hams according to British practice is somewhat analogous to the curing of bacon. Hams may be cured either in pickle or by the dry method, but as a rule they are not pumped in the United Kingdom. Care is taken to remove the blood from the blood-vein, and the hams are then placed in salt, shank downwards, the curing mixture of salt, saltpetre, and dry antiseptic being sprinkled over the cut surfaces. The trimming of a ham is a great matter, and some men are extremely deft at making a presentable article with a few strokes of the knife.

The chilling is conducted at the same temperature as that which applies to bacon, namely, at 38° F., and a good many curers take the precaution to purge the hams in a pickle so as to remove the blood from the blood-vein, after which the hams may be either cured by the dry process or by the wet cure. The hams are left in salt for from twenty-one days onward according to the mildness which may be desired, and this is a matter of

practice which can only be learned by following the needs of the various markets. Unfortunately, there has been quite a large amount of loss in the curing of hams, and this is principally due to the fact that rule-of-thumb methods have, to a large extent, hitherto obtained. Some of the theories accounting for the taint in hams are very wide of the actual truth, and are not based upon ascertained facts. It has been stated that overheating of the animals previous to slaughter, or the diseased condition of the meat, or too rapid chilling of the hams, might account for taint; but all these theories are quite inaccurate, as it has been demonstrated that taint is due to a micro-organism, which has been isolated, and to which the name *Bacillus fædans* has been given by one investigator¹ and *Bacillus putrefaciens* by another.² The latter gives a very full account of the method of curing hams in the United States, and it is worthy of reproduction here, as it shows the main features by which the methods differ, and at the same time illustrates what is generally accepted as the best practice throughout the American continent.

AMERICAN PROCESS OF HAM CURING

Dr. M'Bryde states that after the slaughtered animal has been cleaned, scraped, eviscerated, washed, and split down the middle, the carcass is usually allowed to hang for an hour or so in a large room open to the outside air, known as the "hanging floor". This is done with a view to getting rid of a certain amount of the body heat before the carcass is run into the chill-rooms, and effects a saving in refrigeration.

The carcasses are next run into "coolers" or chill-rooms, and subjected to refrigeration with a view to ridding them entirely of their body heat. The coolers are large rooms fitted with brine pipes, and capable of accommodating several hundred carcasses. The temperature of the coolers when the carcasses are run in is about 32° F.

When filled, the temperature of the cooler rises to about 45° F., owing to the heat given off from the carcasses. The temperature is then gradually reduced to 28° or 30° F. Hog carcasses are left in the coolers, as a rule, for forty-eight hours, at the end of which time they are stiff and firm, but not frozen. The temperature of the chill-room is always carefully watched, thermometer readings being made every few hours and duly recorded. The temperature

¹ *On the Nature and Causes of Taint in Miscured Hams*, by E. Klein M.D.

² *A Bacteriological Study of Ham Souring*, by C. N. M'Bryde, M.D.



SAUSAGE-MAKING

This is the principal subsidiary industry in connection with a bacon factory, and upon its successful working much of the profit of the factory depends

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MAKING PORK PIES

This is one of the subsidiary industries which is carried on in modern bacon factories.

of the carcasses is always tested when they leave the chill-room. In those plants provided with a hanging floor, a certain number of the carcasses are also tested before they are sent to the chill-rooms in order to determine the amount of heat lost on the hanging floor. The carcasses are tested by means of an especially-constructed thermometer, known as a "ham thermometer", which has a pointed metal protector so that it can be thrust into the body of the ham.

The ham has been rightly selected as the proper portion of the carcass at which to take the temperature, as it constitutes the largest mass of muscular tissue in the carcass and holds the body heat longer than any other portion. In taking the temperature, the thermometer is thrust deep into the body of the ham, so that the point of the thermometer rests alongside or a little behind the upper portion of the femur or middle bone, the latter being used as a guide in introducing the thermometer. A certain number of the carcasses from each cooler are tested in this way as a check on the refrigeration. The inside temperature of the hams when they leave the chill-rooms should be about 34° F.

The carcasses are next cut up and the hams trimmed for pickling. In some houses the hams are given an additional chilling of forty-eight hours, after they are cut from the carcasses, but this is not done as a rule, nor does it seem to be necessary.

The hams are now sent to the pickling rooms, or "sweet-pickle" department as this branch of the packing house is designated, and here a certain number are again tested with a thermometer, as described above. This test is carried out by the foreman in charge of the sweet-pickle department in order that he may satisfy himself that the hams are properly chilled before they go into the pickle, and as an additional check on the refrigeration.

The hams are now ready to be pumped, and this pumping, as will be shown later, constitutes an important step in a successful cure. Pumping consists in forcing a strong brine solution containing saltpetre into the muscular tissues of the ham, and is accomplished by means of a large hollow, fenestrated needle, connected by means of a rubber hose with a powerful hand pump. The needle is introduced along the bone, the latter being used as a guide.

In all of the larger packing establishments two general methods of curing hams are followed, the two methods being designated as the "fancy" or "mild cure", and the "regular cure", the term "cure" being used to designate the curing period. Various trade names are given by the different packing establishments to the hams

cured by these methods. In the fancy cure the hams are pumped in the shank only, whereas in the regular cure they are pumped in both body and shank. The same pumping pickle is generally used for the two cures. It is a significant fact that the greater proportion of the sour hams are found among the fancy or mild-cure hams.

The actual curing is usually carried on in large vats which hold about 1400 pounds of meat or some hundred hams. The hams are packed in the vats in layers, and are entirely covered with the pickling solution or brine. A certain proportion is always observed between the weight of the meat and the amount of the solution. The "pickling solution", or "pickle" as it is termed, is a brine solution containing saltpetre and sugar. The composition of the pickle varies somewhat with the different packing establishments. The fancy-cure hams are usually cured in a milder pickle, that is, one that contains less salt and saltpetre than the pickle used in the regular cure, although in some packing establishments the same curing pickle is used for the two cures, the only difference being the additional pumping given the regular-cure hams. The pickling rooms, or cellars, are held at a temperature of 34° to 36° F., and the pickling solutions are always chilled to this temperature before being used.

The hams are allowed to remain in cure for about sixty days, and during this time are overhauled several times. Overhauling consists in throwing the hams from the vat in which they are packed into a neighbouring empty vat, and then transferring the pickle to the new vat. The pickle is not changed, and the same pickle follows the hams through the entire curing process. The object in overhauling is to stir up the pickle and expose fresh surfaces of the meat to its action.

Hams are also cured in tierces which hold about 300 lb. of meat. In the tierce cure, the hams are packed in the tierces, the latter are then headed up, the pickling solution is next run in through the bung-hole, so as to fill the tierce entirely, and a wooden stopper is finally driven into the bung-hole. The tierces are rolled back and forward across the floor on dates corresponding to the dates of overhauling in the vat cure. The object of the rolling is to stir up the pickle, and in this way it corresponds to overhauling in the vat cure.

DRYING OF BACON AND HAMS AND OTHER OPERATIONS

The drying of hams and bacon is a very important part of their treatment. What are called "pale-dried" hams and bacon are merely green-cured products, which have been dried at a temperature of about 85° F., and this is usually accomplished in dark rooms where a circulation of warm air at a temperature of 85° F. is provided, and where the drying takes place in about three days.

OTHER DEPARTMENTS OF A BACON FACTORY

In a modern bacon factory many other departments are specialized, such as the making of lard, sausages, black puddings, brawns, galantines, &c., but the study of these, which is an extensive one, falls under another category.

There is much room, however, for the study of the residual products of modern bacon factories, and of their specialization, and it seems a pity that the technical knowledge involved in the handling of these cannot be obtained at any educational college in the United Kingdom, as it seems quite certain that this particular business is likely to grow to much larger dimensions in the future than obtain at the present day.



CHAPTER IV

DISEASES OF PIGS¹

By HAROLD LEENEY, M.R.C.V.S.

The economic value of the pig in this country is increasingly recognized, and the study of his diseases has of recent years received greater attention, but much remains to be learned before the animal doctor can bring his knowledge up to the level attained in connection with horses, and prove himself as good a guide in the matter of swine diseases. On account of the seriousness of infectious plagues attention has been almost exclusively focused upon them—the means of diagnosis and of prevention, and the measures desirable in the public interest to arrest and stamp them out—and but little has been done to advance the general knowledge of the common ailments by which pig-keepers suffer needless loss. Much ignorant superstition exists, and faith cures are not confined to mystics who practise only on their fellows. In the following pages we attempt to deal with the ailments of swine, as met with by a country practitioner with experience of pig-keeping, and do not devote much space to a consideration of diseases which must be notified and dealt with by the Local Authority. We would merely advise owners to give notice if in any doubt of having infectious disease on their premises. By early recognition and co-operation with the authority the owner will generally save himself considerable loss, and avoid the friction and unpleasantness which too often lingers after an outbreak of swine fever in a district.

Swine Fever

There has been a vast amount written of this disease, which was for long confused with anthrax, with erysipelas, and other maladies. It is now recognized as a very contagious eruptive fever. The causal organism is said to be ultra-visible, or, in plain English, cannot be seen by the powers of the microscope, but a bacillus regarded by pathologists as a secondary invader, and found almost

¹ An index to this chapter is given on p. 134.

certainly in the mesenteric glands if a pig is killed during the acute period of the illness, is deemed diagnostic by the Board of Agriculture and Fisheries. Only by culture of this bacillus and the careful observation of laboratory experts can the question be decided. This is the true reason of the vexatious delay about which all pig-keepers complain. For this there is at present no remedy.

The period of incubation is from five to ten days, and this may well be borne in mind when signs of illness occur after introducing fresh animals, or other contact with the outside has taken place. The outbreaks are so frequently untraceable that a mystery hangs over the subject, and many pigmen believe still that it is spontaneous, or generated without the specific infection, where no intercourse has been had with other swine, as on isolated farms.

Symptoms.—These vary so much according to the virulence of the type of swine fever prevailing at any given time, and prove acute or chronic, that the elect may be deceived, and the verdict of the most experienced veterinary inspector is not accepted without the laboratory tests previously alluded to. This being so, it is not worth our while to detail them, but rather to warn owners to suspect swine fever when they cannot diagnose the ailment from which a pig is suffering, and to remember that when a number of pigs fall ill at the same time, there must be a common cause, either in infection or through some food that disagrees with the animals. Sifting the evidence, and regard for the time at which different individuals have failed, will often enable the pig-keeper to decide whether some damaged fodder or swill with soda and potash salts in it has caused acute indigestion, or an infectious malady gained access to the piggery through buying in fresh stores, or sending a gilt to service where disease was present but at the time not known. The ability of the infective material to live outside the body enables it to be conveyed in dung and litter and in so many other ways that, as we have already said, it is impossible often to trace it, and we should therefore never decide hastily that fever is not present, but hasten to obtain official advice.

Swine Plague, or Hog Cholera

This infectious disease is frequently met with on the Continent of Europe, and is practically always in existence among American herds, but has never gained a hold upon our islands. It is also called pig pneumonia, as it not infrequently attacks the lungs, although better known for those symptoms which gave it the name of cholera.

Swine Erysipelas

This disease goes by the name of red soldier, the blue disease, the purples, swine distemper, typhus, the rose, the nettle rash, diamonds, and pig measles.

It is an infectious fever, with characteristic redness of the skin, and internally of hæmorrhages, and the formation of wart-like excrescences on the membranes of the heart and of the joints.

It has often been confused with swine fever; indeed, so much confusion existed both in nomenclature and in the minds of veterinary inspectors as to the febrile diseases which are accompanied by redness of the skin, that the Board of Agriculture found it necessary to insist on the viscera being sent to the laboratory for proof by cultural methods. (See SWINE FEVER.)

The disease is widely spread upon the Continent of Europe, but in this country usually takes a very mild form, and is chiefly notable for the peculiar diamond-shaped eruption which occurs often on fatting pigs without the owner having noticed the feverish symptoms which precede it in the more severe attacks in other countries. A mild, an acute, and a chronic form are recognized by pathologists. The first is commonly run in about four days, when the eruption marks the crisis and is followed by rapid recovery. The acute ends fatally in a very short time in the majority of cases. The chronic is most often due to a relapse or chill taken during the mild form.

Treatment.—For the variety of it met with in this country nothing more than a saline laxative, such as a dose of salts proportioned to the age of the pig, is necessary. This may be followed by a daily small quantity of bicarbonate of potash, and a diet less stimulating than usual.

The presence of the wart-like bodies on the lining and investing membranes of the hearts of pigs, so often found in the slaughter-house, and attributed to tuberculosis, are no doubt in great many instances due to unobserved mild attacks of swine erysipelas. So greatly do the symptoms of swine fever and erysipelas resemble each other that it is often difficult, without both a post-mortem examination and bacteriological examination, to decide which was the cause of the illness. The pig-keeper will therefore be well advised to seek professional aid or declare his suspicions to the Local Authority, rather than attempt any treatment.

Foot-and-Mouth Disease (Aphthous Fever)

It is not so widely known as it should be, that pigs are susceptible to foot-and-mouth disease, and if not often suffering severely themselves, may be the means of communicating the malady to other species. It is a specific contagious fever, and is manifested by the presence of blisters or vesicles on the lips and snout as well as the feet, sometimes upon the udders of suckling sows. Pigs may be the first animals on a holding to be affected, but it is generally believed that the milk of infected cows is the chief source of infection. The lameness is often very acute, and the feverish animal, disturbed from his bed, walks on tiptoe and shows swelling, in some instances extending to above the fetlocks. The blisters occur between the digits and round the coronets. In bad and neglected cases the hoofs may come off, and extreme emaciation result from the mouth lesions making it difficult to take food.

Treatment may not be attempted in this country, and notice should be given of the owner's suspicions, as soon as the symptoms above referred to are observed.

Anthrax

Anthrax is another of the so-called specific contagious diseases. It is caused by the *Bacillus anthracis*, which has characteristics distinguishing it from all others. When once it has gained entrance into the body it multiplies rapidly, and gives out a toxin or poisonous principle destructive to life. The virulence and reproductive power of the anthrax germ is greater than that of any other to which live stock are liable in this country, and the early death is consistent with such rapid multiplication. The manner in which infection takes place is assumed to be through abrasions, or slight injuries to the membranes of the mouth or digestive tract, but the bacilli may of course gain access through similar openings in the feet or other abrasions upon the body. Careful enquiry into numerous outbreaks among swine, however, goes far to show that the pig seldom contracts the disease except as a result of eating meat containing the specific organisms; it being too general a custom to give dead animals of other species to the omnivorous denizen of the sty.

Symptoms.—Anthrax in the pig almost invariably takes the form known as gloss-anthrax, or localization in the tongue and throat. The affected swine become dull and listless, lying about in attitudes differing from the lazy contentment with which pig-

keepers are familiar, but do not appear cramped when made to move; then the throat is observed to be swollen, the white of the eyes red to purple; some snorting or stertorous noises are emitted with a choking sound, but not a cough. The swelling increases and extends to the glands under the ears (parotids), and breathing becomes increasingly difficult. The temperature rises to 105° or 106° F., but runs down before death occurs, which is from eight to twenty hours, with some variations on both sides of the figures. Pigs affected with anthrax often retain their appetite although unable to swallow, and the bowels continue to act normally. In an outbreak in Somersetshire where a number were kept under observation the whole time, some tried to feed within an hour before they quietly and quickly died. On account of the suddenness of the attack, malicious poisoning is very commonly suspected.

Disposal of the carcass is a very important matter, and no plan but that of cremation is satisfactory. This is now undertaken by, or under the superintendence of, the Local Authority. Every precaution should be taken to prevent contamination of the land, and the carcass should not be opened or the natural juices allowed to escape by removal of the body. It should be burned on the spot, if possible, and all the litter and manure consumed by fire. Contamination of water courses should be particularly guarded against.

Tuberculosis

After cattle, swine are the most common victims of tuberculosis. We have no means of knowing what the percentage may be in this country, but in Denmark, which is so often held up to the British agriculturist as a model, the proportion is stated to be from 10 to 14 per cent. The young are the most susceptible. Pigs of a few weeks old have been found to have lesions which must have been forming almost from birth (caseous degenerations, partially calcified). One of the conclusions of the Tuberculosis Commission was that pigs were subject to the bovine, the human, and the avian types of the bacillus, the first-named being most commonly present.

It is probable that the chief portal of infection is the alimentary tract, as dairy products are so generally fed to pigs, including such doubtful milk as the farmer will not employ himself or send to market. Besides this source of tuberculosis, the sow may infect the whole litter through her own udder. Whole farrows have been recorded as infected by this means. The various glands of the body are the most attractive, but tubercles in various forms are to be discovered in any of the organs, and in some cases in the bones and

joints. There is a marked disposition to generalization of tubercle in swine. Symptoms are necessarily variable, according to the tissues involved. When the bowels are implicated, scour or persistent diarrhœa, with colicky pains, and a blown belly, capricious appetite, with pale nose, sunken eyes, and emaciation may be looked for. If the brain and spinal cord are affected, fits, paralysis, squinting, and twitching of the limbs are prominent symptoms; and a dry cough, occurring in sharp paroxysms, denote the lung form of the disease.

The rapidity with which the disease develops bears some proportion to the age of the affected animal, the young rapidly failing, and older swine bearing its ravages with more tolerance, often, indeed, proving tuberculous at the slaughter-house when not suspected during life.

Treatment is useless and undesirable from every point of view. The object to be attained is the elimination of the disease from our herds, and this is best done by the slaughter and post-mortem examination of suspects, and the fatting off of doubtful sows.

Constipation

Hard excrement in which there is much dry material causes a difficulty in evacuation, and long retention in the bowel leads to febrile conditions, sometimes to actual stoppage, inflammation, and death in pigs that are injudiciously fed or not properly watched. In winter, in oak districts, acorns are often partaken of too freely in the ripe condition, and the tannin they contain causes constipation and more or less of the acorn-poisoning disease which proves fatal to cattle. Swine can consume larger quantities of acorns with profit than any other stock, but they sometimes get too much, especially when unprovided with enough of other foods. Penned pigs with no grass, and called upon to clear up whatever is not good enough for other live stock, suffer from indigestion, which may not materially affect their general well-doing, at least for a time, but creates in them a morbid appetite which incites them to eat their bedding, and when this consists of damaged straw, hay, and most of all of ferns or brakes, great masses of innutritious fibre agglomerate in the large bowel, and a dangerous form of constipation results.

Success in pig-keeping and the profitable consumption of what would otherwise be waste products, is apt to engender carelessness on the part of the pig-man, who does not daily observe the excretions with the same care as a stableman is taught to do, and so it happens that constipation goes on, and the straining animal is not

treated when a simple remedy would serve the purpose. We have seen straining sows, blocked with moss litter or ferns, finally given croton beans or oil, and killed by the violence of its operation, the gut being burst inside, or acute inflammation established, or, after the action of the drug, the arse gut or rectum has been everted, with serious if not fatal consequences. The latter accident is easily provoked in very young pigs. (See *EVERSION OF GUT, OR COMING OUT OF THE BOWEL.*) We have mentioned the commonest causes of constipation, but the blocking may arise from others, such as tubercles or other tumours, and by adhesions of the bowel upon its own folds or to the side of the belly or abdominal organs as the result of chills, rheumatism, and peritonitis. The pressure of the gravid uterus in sows advanced in pregnancy is a frequent cause of constipation, and gilts should receive special care when small in the belly and loaded.

Treatment.—The careful pig-keeper will not resort immediately to drugs, except in a neglected case. He will withhold food except of a laxative kind, such as large, sloppy bran mash of the broad variety, and if the subject will take linseed (which most swine will do), he will add a portion of the crushed meal, which holds the oil. It may be said of pigs, and of all other species, that mechanical laxatives, rather than aperient medicines, restore the contractile powers of the bowel to continued healthy action; drugs acting for the time, but leaving a disposition to recurrence of the trouble. In the more urgent cases we must have resort to castor oil, which acts best in conjunction with equal parts of linseed oil, and is less likely to be refused in a small quantity of the food the individual animal is known to like best. Salts and sulphur are excellent aperients for swine, but there is no good reason for the black sulphur being given a preference for this purpose. The dark colour of sublimed sulphur was originally caused by being contaminated with iron on the part nearest the circumference of the retort or sublimating iron bell; but what is generally sold at the shops is merely discoloured by the addition of a little lamp-black or charcoal, and is by that much weaker and not better. Sulphur and salts, jalap, and other drugs will generally be taken in food, if mixed with melted lard or other animal products, in the case of pigs not accustomed to slaughter-house refuse, and it is always desirable to physic pigs by guile rather than by force, as they are difficult to restrain and easily choked. If force has to be employed, there is no better instrument than the old boot with the toe cut off; the patient may bite it or do what he likes without injury to himself, and cannot fail to get the dose if the shoe is kept in his mouth long enough. The lower

jaw should not be roped for the purpose of holding him, as it may be broken by his violence. The noose should be placed behind the tusks of the upper jaw. If such handling is necessary for drenching in a case of constipation, the opportunity should be taken, while he is under restraint, to unload the rectum mechanically with an oiled finger, and by syringing in warm water in which plain soap has been dissolved, or some neat glycerine from a proper syringe made for that purpose, or a mixture of oils, as recommended for oral administration. It often happens that the chief obstruction is in the terminal portion of the gut—a hard portion of dung acting as a stopper or cork to the canal—and if this is mechanically removed, the way is made easy for the passage of ordure from behind. Some pigs are of constipated habit, and must therefore be given roots and linseed oil mixed with other foods, if circumstances do not permit of grazing, the latter natural laxative being of course the best, and assisted by an hereditary power of selection.

Diarrhœa or Scour

An irritable state of the bowels, and the too frequent passage of more or less fluid evacuations without pain or straining or inflammation, is what is meant here, not the infectious scour or skit. Whether in sucking pigs or those independent of the teat, scouring is almost always a sign of indigestion, and to seek the cause and remove it must be our aim. Young pigs are much more prone to scour than adults, and this applies particularly while they are on the teat. A change of food on the part of the sow, chills, excitement, rank grass such as often grows round the enclosed homestead where a sow is first let out with her offspring, grass grown under beeches, and acrid plants, as buttercups, which are commonly avoided at other times, will be consumed by the sow but recently released from the imprisonment of the sty and the incessant claims of the young from which she has had no respite. The foraging sow is often so gross a feeder that she will disinter a carcass or consume a decaying fowl, and even eat a phosphorized rat. The result may not seriously affect her own health, but so acts upon her milk as to scour the piglings. Foul material on the sow's deals when she has wallowed in the black mud of a half-dry pond may infect the young, as will the consumption by the mother of putrid vegetable matter, and excessive quantities of salt and dish-washing substances in the swill collected from houses where everything is thrown indiscriminately into the waste tub, or the "corruption bucket", as we have heard it well named. Young pigs very early

acquire worms and often in large numbers, and these set up scour. They may be purged also from tuberculosis acquired from their mother's milk or from that rejected by the dairy manager. (See TUBERCULOSIS.) Persistent scour in older pigs must be regarded with suspicion, as the ability of the pig to accommodate itself to all sorts of food is well established, and persistence in the use of an ill-balanced ration is often overcome, although the best results are only obtained by the most judicious feeding. Many cases of scouring are traceable to disorders of the liver, either functional or structural, this organ being subject to both the cystic or hydatid and mature form of the echinococcus tapeworm, besides flukes and filariæ and tubercular deposits. The sharp teeth of young pigs sometimes so irritate the teats of the gilt or young sow with her first farrow, as to affect her milk and cause scour in her young. In those families where this trouble occurs, the piglings should be caught up and the nippers broken off, as they will be replaced by others before they are needed. The scour of young pigs is often accompanied by colicky pains, and the youngsters seem frightened, and cry out or adopt cramped attitudes or rush across the apartment, or the belly tucks up and they become unrestful and don't remain in the nest in the contented manner we like to see and which indicates prosperity on their part.

Treatment.—Having so many causes, we cannot give a single rule for its treatment, but if we were confined to one remedy we should choose castor oil, because it is amply proved that in the majority of cases scour in all young animals is the result of indigestion, and there is some fermentative matter that needs removal, and further, that scour is Nature's method of getting rid of it. If we then give a safe and non-irritating aperient, we are promoting the plan and saving time, for the sooner we have emptied the bowel of deleterious matter the sooner will the normal functions be resumed. This is the explanation of the apparent paradox when an aperient is given to cure purging. In those cases where pain is present, we may add a few drops of chlorodyne for a young pig, or a teaspoonful for a gilt, and twice that amount for a big old sow or boar, and if the irritability of the membrane continues, we add to the food a few grains of bismuth and carbonate of soda, and for grown pigs some calumba root or infusion of that drug. Powdered opium with catechu will sometimes be taken in food when chlorodyne is refused on account of the smell of the oil of peppermint in it. Nor should a dry astringent diet be adopted immediately, as the bowel membrane must have only soft foods in contact with it until digestive power is restored. Boiled cake gruel and linseed tea, and for other

food preference may be given to baked flour with a few grains of bicarbonate of potash added. It is important to keep sties clean and give additional litter, so that bowel discharges do not accumulate and give off bad odours, or the little pigs stain themselves and their fellows and inhale the dried dust when in the nest.

Inflammation of the Stomach, Gastritis

Although not often recognized, this is a frequent disease in pigs. It might be expected, having regard to the habits of swine scouring the ditches for all sorts of unsavoury food, or living in filth in the cottager's sty, and receiving all the refuse and often injurious substances, and drinking polluted water. A not infrequent cause of gastritis is the consumption of a poisoned rat or the phosphor bait laid for such pests of the piggery. Another common cause, the most common of all on the outskirts of large towns, is the wash or swill collected from hotels and boarding-houses, where a good deal of sound food is mixed with much that has been soured and is teeming with ptomaines and injurious organisms, if not made irritant by the addition of dish washings containing salt, soda, and caustic potash preparations sold under fancy names and intended to do the work of the scullery-maid, if used in extravagant proportions. Besides brine, containing a large amount of saltpetre, which gets into the pig-trough even from farm-houses, where it should be known as injurious, pigs will find a partly used packet of arsenical sheep-dip, and if not killed at the time, suffer from acute gastritis. Pigs that have made long journeys fasting, and have been given their "fill" on arrival, have acquired gastritis through such engorgement, and those belonging to butchers who slaughter their own cattle (they are becoming very few nowadays) will persist in giving offal to pigs, often buying half-starved and gaunt sows on purpose to eat up such stuff mixed or not mixed with meals. Symptoms are generally acute and attract the attention of the feeder, as the affected animal does not come to the trough on the sound of the bucket. The expression of pain in the countenance is clear to anyone acquainted with the habits of swine. The sufferer hides in the litter, or is consumed with a restlessness that is only stayed by cramp when the belly becomes tucked up and the back arched. There is great thirst, and the skin is red in appearance and hot to the touch. Vomiting relieves the pain for the time, and is again provoked if the animal takes solid food. After being sick the pig will drink deeply of cold water, which no doubt eases the burning stomach, but seems to increase the disposition to colicky pains. In

gastritis confined to the stomach there may be constipation of the bowels, but if the inflammation has extended to the intestines, scouring or violent purging may accompany it. If the animal is not sick he is very likely to be blown up with gas and show great tenderness when the flank is pressed.

Treatment.—The most important thing in the treatment is to secure rest for the organ. No dry or solid food should be given, but the membrane should be soothed by linseed tea, or thin flour or oatmeal gruel, with 1 to 3 drops of dilute hydrocyanic acid, every four hours during the vomiting stage. Pinching pains may be controlled by a grain or two of powdered opium, or a few drops of chlorodyne at intervals of two or three hours. The blown condition must not be allowed to continue, but should be counteracted by some carbolic acid, a few drops mixed with glycerine and then with warm water; or hyposulphite of soda may be given if repeated doses are found necessary. Pigs are more often lost through a relapse than by the first onslaught of the malady, as they are allowed the ordinary ration directly they seem to be better. Too much care cannot be exercised in this respect, and the patient should have only slops for several days, and get back by degrees to his ordinary food. As invalid food, milk and bullock's blood is helpful, but the latter must be fresh. At some time during the illness the difficulty of dealing with constipation arises, and no stronger remedy than castor oil should be given. If this is mixed with an equal portion of linseed oil and then with warm milk, it will probably be taken without resort to the shoe or medicine bottle. For the purging, when the bowel is involved, small doses of chlorodyne are advised; but it should be remembered that a certain amount of scouring is necessary and even desirable before the digestive powers can be restored to the intestine.

Coming Out of the Bowel

Pigs at any age may suffer from extrusion of the gut or eversion of the rectum, but the accident most frequently happens to the very young when distended by bulky swill and having insufficient solid food, and to sows at or about the time of parturition. It may also happen to the subjects of constipation, when frequent straining has resulted in expulsion both of the hardened mass and of the gut itself. When found in this condition the extruded portion of the rectum presents the appearance of a round red or purplish mass. It may also follow on the relaxation of the parts due to persistent diarrhœa, or obstruction to the passage of urine in females.

Treatment.—When the subject is fat it may prove the best policy to call in the butcher, as there will be no well-doing or gain made in flesh for some time however successful the treatment adopted.

The earlier a case is taken in hand the greater the chances of success in returning the gut, and, what is more troublesome, its retention when reposed. Before attempting this operation the tumour must be washed with warm water and a weak disinfectant, this part of the business being performed without any great restraint being put on the patient; then it is necessary to secure the animal, if a small one, by holding it up by the hind legs, a little apart, while with a finger dipped in carbolized oil the mass is gently but firmly pressed back into its natural position. If the pig's hind feet are off the ground the position greatly favours the operator. With larger animals it may be necessary to noose the upper jaw and have a second assistant to stand astride of the pig with his knees steadying the body while the operator replaces the gut from behind. It is not so difficult to do this as one supposes who has not accomplished it; but its retention is our chief concern, and the pig strains and seems bent on forcing it out again. Very strong sutures or stitches may be put in, care being taken to have plenty of substance or "hold" so that the sutures cannot tear out. For the same reason the material employed must not be too fine. Better than any stitches for this purpose is the prolapsus clamp invented by Mr. West, and known by his name. It cannot tear out, and having a screw attachment permits of release to accommodate swelling. It will be referred to again in connection with parturition. If the gut is forced out again the performance must be repeated. To reduce the desire to evacuate, a dose of opium, or the mixture known as chlorodyne, should be given, and the patient kept without any solid food or bulky substances for a couple of days. No swill that may distend and only a few grains of corn to sustain the animal should be allowed. The writer has found in the case of small pigs distended with weak foods, as well as with sows that have prolapsed, that a few grains of maize or of beans or nuts have a satisfying effect, while occupying no room and allowing the belly to fall in and draw back, or at least favour the retraction of the rectum. When constipation has been the cause, and there is still some impaction, the case is made more difficult, because an aperient must be given. Neat glycerine in considerable quantity, sent in by a syringe, is then a good remedy, while linseed oil may be given in the small quantity of food allowed. If the gut is retained for a few days, the probability is that it will not again be everted if due care is exercised

in the feeding, but the animal must never be allowed to suffer either from constipation or diarrhœa. An astringent suppository introduced into the rectum, or a cold douche to the anus, may also be used with advantage.

Hernia, Broken or Burst

Ruptures are generally known by the above terms, and may refer to those occurring through accidents or by congenital defects. Seldom do we find the ventral herniæ, or accidental breaches in the belly wall which permit the intestine to escape, in pigs, but two forms of rupture are perhaps more frequent than in other animals of the farm. These are scrotal and umbilical hernia, or escape of a portion of intestine into the purse of the male, or of some portion of the viscera into the navel aperture, the latter being known as umbilical. Both these ruptures are due to imperfect closures, and are born defects—a fact to be kept in mind when considering if a sow or the produce of a particular boar should be kept as breeding stock, since there is a disposition to recurrence of the trouble in future generations. “The predisposition to hernia is hereditary”, says Professor Axe, than whom no one made a closer study of swine.

Symptoms.—These are generally obvious, a more or less varying tumour or enlargement being seen at the different seats of rupture. Their very sudden appearance leads the inexperienced to think that some external injury has caused the swelling, and we have known the fatal error committed of puncturing the supposed abscess. In other pigs they come slowly, but in all vary according to the distended or relatively collapsed condition of the belly from food or abstinence. Young pigs in their play sometimes cause ruptures, and then there may be signs of pain in the loss of spirit, but congenital defects leading to the kinds of hernia above do not often have any immediate effects upon the health or well-doing of the animal.

Treatment.—A boar pig with scrotal hernia will not of course be kept for breeding, but marketed as early as possible as a little jointer, for which there is always a demand in cities. For emasculation of broken pigs see art. on CASTRATION. In a few instances it may be desirable to operate for the relief of entangled gut, but this should properly be left to the veterinary surgeon. If an owner is compelled to do it himself, the pig should be fasted, and secured upon his back while the skin is opened and the extruded tissues pushed back into the abdominal cavity, while a few soluble sutures

are placed in such a manner as to form a net for the viscera to rest upon, while adhesive inflammation is providing a natural bulwark. It is usually quite successful, as pigs bear abdominal interference well, and are not so susceptible to what are known as "dirt" diseases as other species which have not acquired a partial immunity by constant exposure to filthy conditions.

Apoplexy

This name is generally applied to rupture of a blood-vessel in the brain, more particularly those in the network at the base, or upon the floor of the cranium, to put it another way, and the suddenness of the collapse and death gives rise to suspicion of poisoning and search in the wrong direction, namely, the stomach, which is sometimes submitted to analysis, when a careful examination of the contents of the skull would have disclosed a clot or signs of hæmorrhage. Apoplexy is not confined to the brain, but may occur in any of the organs, as the lungs and heart, the liver and spleen.

It is an increasingly common malady, and appears to have some relation to the production of early maturity or rapid development of swine by selection for that purpose. We know that the dentition has been so altered that two tables are now found necessary to show the difference in the improved and unimproved breeds, and it may be that the structure of the blood-vessels has not kept time or made the necessary development to withstand the strain, although this may be expected when a standard is attained. Whether this view correctly interprets the frequency of apoplexy in the fast-growing pedigree herd or not, it is the experience of breeders that the forcing of points is at the expense of stamina, or at the risk of other troubles. The disease known as milk fever is relatively rare in the beef breeds of cattle, and most frequent in the deep milkers, which have been carefully selected for their milking qualities.

Forcing foods or too highly stimulating a diet has the same effect, and more particularly when the young animals are taken from poor keep and the change is made suddenly. Cottagers' pigs removed to the butcher's sty and given blood and refuse from the slaughter-house are frequent victims. Overdriving or heart strain or engorgement of the stomach, and in sows the violent expulsive efforts during parturition, sometimes lead to rupture of blood-vessels or apoplexy.

Symptoms.—We have referred already to the suddenness of

the attack. No warning may have preceded the staggering and falling of the animal, which dies as if a fatal blow had been given or a shot through the heart, or a seeming fit precedes the collapse. If the animal does not die quickly, it remains unconscious and cannot keep on its feet or sit up even if assisted. The tongue blackens, and the eyes remain open and staring, but seeing nothing, and do not respond if a finger is placed on the globes, nor are pin-pricks felt in the skin. The breathing is heavy and slow, perhaps snoring, and control of the sphincters is lost, the dung and urine being passed involuntarily. Although some subjects will live for hours the majority only last minutes, and recovery is rare indeed.

Treatment.—The chances of successful treatment are so remote that our chief object should be the saving of the carcass, which will be quite good for food if the animal is promptly stuck and bleeds freely. The blood will not flow if much time is lost, and then the carcass will be a bad colour and condemned by the inspector. Prevention must be looked for in the administration of purges to the gross and plethoric, and the judicious feeding of bought-in pigs, beginning with a light ration, and increasing the quantity and quality by degrees.

Fits or Falling Sickness

Epileptic or cataleptic fits may be confused with apoplexy, especially in the first few moments, as both troubles come on suddenly in swine apparently in good health, and without warning of any kind. One should therefore make sure before using the knife that the seizure is not in the nature of epilepsy, for this is seldom fatal, and the victim generally recovers so quickly that he may be found again at the trough while the attendant has gone to fetch something. Fits, however, most frequently recur, and the little pig approaches the trough eager for food, and almost as soon as he has raised his head, tumbles over and struggles on the ground.

Causes.—These are obscure for the most part, but it has long been observed that fright and over-distension and intestinal worms and teething difficulties add to the number, or the fits would not cease when these supposed causes are removed. It has been observed in connection with gravel accumulations in the bladder, with concretions or so-called stones in the stomach and kidneys, and during the excitement preceding the first service both of boars and gilts or yelts. Sows suckling too many pigs sometimes have fits, but they differ from those of the young, and are more

in the nature of eclampsia as seen in the bitch, and ushered in by blowing and frothing at the mouth and swaying, while trying to keep on their feet, and not by tumbling over suddenly without preliminary distress. In their case the prospect of recovery is fair when the cause is removed.

The symptoms are tolerably familiar to pig-keepers, and the most important matter is to distinguish between them and those of apoplexy. In the latter we have said that the unconscious animal is limp and motionless. In the epileptic fit the pig is convulsed, and presently stiffened out, and more or less trembling of the whole body is observed; the mouth is closely shut, perhaps the tongue bitten, and in any case more or less frothy saliva or foaming is present. After the stiffening period and the rolling eyes which mark the crisis of the fit, the legs begin to work and the jaws relax, and the animal champs and looks round in wonder as to what has happened, and as consciousness returns, rises, and in most cases makes for the trough, if others are feeding. In some pigs, older ones more particularly, the fit of helplessness is succeeded by frenzy, squealing and rushing about as if frantic, taking no care of the head, which may come in violent contact with the wall or a tree. These cases leave the animal weak and low for some days as if suffering from shock. Fits in some pigs recur at such frequent intervals that exhaustion follows and death results.

Treatment.—If the fit is of any duration the pig may be prevented from biting his tongue by inserting a gag in his mouth; a piece of stick out of the nearest hedge will serve the purpose. Besides the risk of biting the tongue, suffocation occurs, in the few that die, by the tongue falling back over the passage and preventing air entering the larynx. Cold water from the rose of a garden can poured over the head is helpful in restoring delayed consciousness, but in the large majority of cases there is little help to be given and nothing at hand in the way of remedies. The chief concern of the pig-keeper should be to remove all probable causes, such as we have already named. Any irregular teeth should be extracted, an aperient dose of medicine given, and the diet lowered; the quantity given at one time should be reduced as well as the quality. Worms are often present when unsuspected, and medicines should be given to ensure their absence, if not to expel those present. By eliminating the known contributory causes we reduce the risk of fits.

Lock-jaw, Tetanus

The pig, like all other species, is liable to the entrance of the tetanus bacillus into wounds, and the disease more familiarly known as lock-jaw, although the fixation of the jaw is not an invariable symptom. The micro-organism is prevalent in garden soils, and the refuse in sties favours its preservation and multiplication. Swine, as we have elsewhere observed, are largely immune to dirt diseases, but the tetanus bacillus is not to be denied in man, or beasts of any species. All that is needed is an open wound or a slight abrasion for the organism to gain entrance. It is therefore not surprising that the disease is most frequently found in pigs after castration, and during teething when the gums offer a portal to the germs.

Symptoms.—These appear in from two to four days after cutting or other injury, and great stiffness is observed, the pig seeming to be “all in one piece” as the attendants say, the head is poked out, the ears stand up or prick forward in an unusual manner, and staring eyes give an anxious expression to a pinched face. The back is often arched, and this may be either in an upward or downward direction. When made to move, the animal staggers and falls with the legs out stiff, as in a fit. The last-named symptoms so greatly resemble poisoning by strychnine, that pigs found in the advanced stage and not previously observed to be ill, are believed to be poisoned. Recovery is rare indeed, and slaughter is generally recommended, as there is no danger from the use of the carcass. Treatment of a wound by cleaning out and the application of a strong disinfectant, would, however, be worth while in the case of a lean animal with no carcass value, as the bacilli do not circulate in the body, but reside only in the wound, and it is their peculiar toxins which have the effect upon the nervous system. If, therefore, the source of them can be stopped, as is done with other animals, there is a chance of recovery.

Rheumatism

This is a malady that frequently afflicts the pig, and if those conditions commonly attributed to its production are not present in his housing, then they are nowhere to be found. The small sty with a wet yard and the absence of sufficient dry bedding are the conditions in which we most commonly find him; but there is something yet to be learned about the originating causes of the disease, for those who, like the writer, have had long experience

of pigs when ill, have found rheumatism as common in the model piggery of the wealthy as in the cottager's hovel; indeed, a well-roofed sty of thatch and a fair amount of bedding seems to offer better chances of escaping rheumatism than the lofty building with metal roof upon which the breath of animals condenses and runs down the walls. In buildings of the latter kind we have observed the disease to be the most persistent, and have known it to abate or wholly disappear with the substitution of thatch or a felted and boarded covering.

There is, too, a good deal of confusion in regard to rheumatism. The cramp of little pigs in the nest is often called rheumatism. If the reabsorption of urine through huddling in the nest on long dark nights is rheumatism, so also is the inability to eliminate waste products in older pigs. Joint ill, due to the entrance of specific organisms, is another malady attributed commonly to rheumatism. Inflammation of joints due to tuberculosis (tubercular arthritis), and many heart lesions have been called rheumatic in origin. Apart, however, from the confusion which exists in regard to the affection we all recognize that it is common, and may be acute and accompanied with high fever, loss of appetite, and much pain and lameness; or secondly it may be intermittent, coming and going as it does with pig's masters; or chronic, and with but slight remissions of the pain and lameness. It is undoubtedly hereditary in some families, and the present writer would go further than Professor Axe when he said that "there is some reason to believe that disordered digestion is in some way conducive to it", and say that it is probably the chief cause, as inducing an imperfect balance between the anabolic and catabolic functions, or those of assimilation and the excretion of waste.

The symptoms of rheumatism, or what we call by that name, need no detailed description; the lameness, stiffness, grunting, and difficulty of movement are apparent to the novice among pig-keepers. It is often sudden in its invasion, and it is more frequent in spring and autumn as all will agree. So are farrows of pigs.

Treatment.—The benefit to be derived from aperients boldly and even frequently administered, goes far to prove our view of indigestion as a chief cause. Castor and linseed oil in equal proportions may be the most suitable for a first dose when action of the bowels is urgently needed, but for subsequent dosings Epsom salts or Glauber's salts are preferable, and these salines may be given in alternation with sulphur in powder (flowers of sulphur). Sulphur has always been highly esteemed as a pig medicine, and in repeated moderate doses is anti-rheumatic, alterative, and gently laxative.

If indigestion is a contributory cause, it follows that the food question must be carefully considered, and if much saccharine matter has been given, or a lot of flesh or blood, or meals only, and of too heating a nature, as maize, barley, and beans, then a complete change will be made from whatever the swine have been having. In addition to the use of aperients, we have a very valuable drug in salicine and its combinations. Salicylate of sodium, in doses apportioned to the age of the pig, and at four- or six-hour intervals, will often have the most satisfactory effect—"work wonders", as the owners say. This is very marked in those cases affecting the loin, and making heavy animals absolutely refuse to get up. Small doses of nitre are also given when the urine is high-coloured. It is of course important to provide a good dry bed, and it may often be possible to take the patient to higher ground with a south aspect.

Rickets

This must not be regarded as a local affection of the bones merely, but as a condition of mal-nutrition, preventing the due development and growth of the young. Many theories have been put forward with regard to this disease, but we are still very much in the position of our fathers, who recognized that want of fresh air and exercise, damp and dark houses, and food deficient in lime must be recognized as the chief causes. By feeding without lime in any form, rickets can be induced. An abundant potato harvest, when "pig" potatoes must be used at home, is always succeeded by a prevalence of the disease. We find it, too, among pigs too largely dependent on swill or kitchen refuse, and the proportion of animals confined in buildings and showing rickets is always greater than those having their liberty. Rickets is less often seen in a limestone district than a sandstone or granite or gneiss. That the disease is hereditary there is no room for doubt, and we should avoid breeding from those related, although not themselves suffering.

Symptoms.—The general unthriftiness and a sour diarrhœa and scurfiness are often overlooked or attributed to other causes, and it is not until the limbs begin to show deformity that owners usually diagnose the malady. Rickety pigs are not lively, and do not forage like others, but seek warmth and keep in the litter; they grow stiff and often lame, and the trouble is assigned to rheumatism or cramp. Swelling of the joints or bulging may appear first, but the commonest deformity to show itself is the shortening of the front limbs, and consequent lowered position of the front half of the

animal, whose elbows will be seen to stand out more or less, and give him a dwarfish appearance. All sorts of curvatures of the spine result from rickets, and the back may be bent in or arched upwards—"roached" it is generally called. The proportion of animal to mineral matter is wrong, and because of the excess of the former the bones yield in various directions. Sometimes rickets takes a mild and slowly progressive form in fatting pigs, when it is generally supposed that the body is too big for the frame.

Treatment.—Autumn-born pigs that prove rickety in the short days are rarely worth the food they consume, as sunshine and light and pure air, with a fairly high temperature, may be counted among the best curative agents, and these are wanting generally in the winter. A vigorous state of health should be tried for by giving the best of food and dry, airy, well-bedded houses and exercise, although lameness may be a hindrance: ground oats and pea flour, barley-mcal, and boiled potatoes make a suitable mixture. For a time rickety pigs will profit by cooked food, which more rapidly supplies the deficiency in an easily-assimilated form; but this recommendation must not be taken to apply to healthy swine, which have been proved to profit better by uncooked food. For medicines, cod-liver oil, iron in solution and mixed with food, and lime salts are the most approved, but only small quantities can be used profitably. Rickets may, in fact, be as much due to inability to appropriate bone materials as to their absence in sufficient quantity in the food supplied; the fact that some prosper on the same ration is proof in itself. Charcoal, fine coal, or ashes should be accessible to pigs suffering from this disease.

Gravel

Urinary troubles in pigs are most frequently caused by the falling out of solution of the salts contained in urine, and which, in normal circumstances, are passed in the water at intervals. The restrictions imposed upon the liberty of swine in the majority of cases is prejudicial to a proper performance of the organs. They are fed to make fat. For the same reason exercise is curtailed, and these circumstances all dispose the urine to become thick and the salts to precipitate in the bladder. More than this, the heavy pig is himself indisposed to the necessary effort to empty the bladder until the accumulated pressure makes him more than uncomfortable. There is reason to suppose that many pigs suffer from what we call rheumatism because these salts of urine, which represent waste tissue, are not ejected from the body, but retained

or returned in some measure into the circulation. Elsewhere we have alluded to the cramp of little pigs in the nest as being caused by their reluctance to leave the warmth and urinate on dark, cold nights. Mr. Sanders Spencer's advice to disturb the piglings in the long winter evenings, so that they may go outside, has proved a means of prevention of cramp in our own experience since passing on his *obiter dictum*.

Symptoms.—These are much the same as when any interruption to the stream occurs, but there is one reliable method of diagnosis, namely, that of introducing an oiled finger into the rectum and compressing the bladder. If any great accumulation is there, the impression is imparted to the person so operating of pressing upon a warm bag of sand. Frequent passing of water is a symptom, but only a small quantity is voided. Interruptions to the stream or stricture appears in other cases, or it may be that control is lost, and the urine simply leaks away. Instead of the clear and almost colourless water passed by healthy pigs, enjoying their liberty, a milky fluid is observed, and scalding and swelling of the penis occurs in bad cases. When examined after death small white crystals or powdery matter is found to occupy a large space in the bladder.

Treatment.—Only preventive measures are practicable in the case of swine, although other species can be successfully operated upon. The most economic course to pursue, on ascertaining the presence of much sabulous matter in the bladder, is to hasten the fatting process, and get the butcher while no interference with the general health results from a purely local inconvenience. More exercise should be insisted on, if it consists only in compelling a very heavy animal to move about the sty three times a day, as movement suggests urination to the pig, whether big or little, and the disturbed nestlings are sure to avail themselves of it when stirred out at night. Actual stoppage of urine may soon cause a ruptured bladder, blood poisoning, or peritonitis, and death, and the carcass is unfit for human consumption. In such case immediate slaughter will "save the life of the pig", as the saying goes, when the necessity arises for such action.

Nettle Rash, Urticaria

Skin diseases, other than those caused by specific constitutional eruptions such as have been described in connection with swine fever and plagues, are not very numerous, but often very troublesome. An eruption known as nettle rash or urticaria comes up

very suddenly, as it does in horses on a journey and upon human skin when stung by nettles. Besides this rash, another has of late years been imported, and is often called "diamonds", from the remarkable shape of the eruptions and their discrete or distinctly separate eminences.

Causes.—There is a predisposition to nettle rash in some families as well as in individuals, but it is not proved to be due either to a thinner skin or confined to any particular colour, although white pigs scald in sun and in frost perhaps more than the black varieties. If it occurs on a black-and-white pig, however, it will generally be observed on the white portions only. It has been frequently noticed in connection with indigestion of an acute type, when either constipation or diarrhœa were present, and as a result of diseases of the liver, whether functional or caused by extensive invasion by parasites. Frosted or decayed roots, new beans, too many peas, and a surfeit of acorns, have apparently produced it at different times. Gilts in pig get it very acutely.

Symptoms.—Rubbing often passes unnoticed, as it is the habit of pigs to rub, but they do so more vigorously and continuously when the eruption is about to appear. The patches are white, and somewhat raised above the level of the surrounding skin, with a red area or ring outside them, and may be half an inch across, or three times as large, and in various parts of the body. It disappears almost as suddenly as it comes, and leaves no injury unless the animal has inflicted it by too vigorous attentions. It is not important in itself, but should be taken as an indicator that something is amiss in the diet. A purgative should be given, and food withheld for the greater part of a day while the alimentary canal is emptied. Grass is one of the best of pig medicines, and should be brought to the patient if he cannot seek it himself.

Diamonds

These are said to be caused by swine erysipelas, and in many countries accompany a serious and not infrequently fatal illness, but as seen in this country they consist in diamond-shaped eminences so remarkably clean-cut as to have acquired the name here given. Sometimes they coalesce, and the pig rubs them, and large sore areas result. The benign form in which the disease occurs in this country, and its frequent disappearance without any apparent illness or subsequent skin irritation, is the reason for placing it in its present position, although not correct pathologically. A dose of castor oil and a few teaspoon doses of bicarbonate of soda, with

a like amount of salts, will be all the treatment needed, unless to this we add any simple emollient, such as vaseline or olive oil, if the diamonds break.

Eczema

An eruption in which vesicles or bladders form after a period of redness which may not be observed. Only exhibition pigs are sufficiently watched to get the attention needful; the ordinary commercial pig attracts attention when he rubs and is scalded by breaking of the little vesicles and the formation of a confluent sore or of drying scabs. There will probably be both on the same pig, as the eruptions will not all be of the same age. The young and the old are the most frequent subjects, and indigestion may be said to cause it in almost every case. The young, unaccustomed to food of a particular kind, show its disagreement by this condition of skin, and the old, whose vigour is past, and may be worn out with reproduction, and fed on any refuse, when not valued for pigs *in utero* or on the teat. Sudden changes from a wholly vegetable to a largely flesh diet will often cause an outbreak in the butcher's or knacker's piggery. Excessive maize feeding or too many new beans, bran that has gone sour, and roots that are frosted are among the causes of eczema. Pigs fond of wallowing and sun-baking are liable to vesicular eruptions which pass as eczema. Degenerate or inactive livers and parasitism no doubt account for some cases of eczema, as well as the excess of salt and soda and potash preparations which find their way into swill.

Symptoms of eczema are distinguished from nettle rash and diamonds by the presence of actual blisters, or vesicles as they are called. At first red, they soon fill with a somewhat watery or serous fluid which becomes milky, and, if not broken by rubbing, presently dry off, and leave a scaliness or scabbiness according to the number and extent of the eruption. When the scabs fall off the skin remains a little red for a time, but perfect restoration may be expected if the animal does not do itself damage while annoyed by itching. In some pigs the disease is recurrent, and no sooner is one lot of scabs got rid of than another crop appears.

Treatment.—Seeing that it is associated with a fermented and unhealthy condition of the digestive organs—indigestion—we must first clear the course with a suitable aperient, such as castor oil, unless we have reason to believe that the liver is the seat of the mischief, when we may give a dose of calomel, or repeated small doses of salines, such as Epsom salts, Glauber's salts, potash or soda bicarbonates: these substances acting well on the sluggish liver if

given over a sufficient length of time. The cause of course must be removed. This is often sufficient in itself to ensure an early recovery. Farmers' pigs enjoying the advantages of grazing seldom get eczema, except through some gross error in feeding. Those pig-keepers without grass may be advised to get it, although no greater facilities than the garden lawn-mower are at hand. Grass is a great pig medicine, and its virtues are enhanced by abstinence. It is none the worse for a few worms' casts which will get into the carrier. As an outward application after cleaning with soft water and soap, lard free of salt is as good as anything. Zinc ointment is often recommended, but makes a pig sick if it is licked. Sulphur ointment is more or less gritty, and the writer has seen eczema cases made worse by its injudicious employment. It should be reserved for the next skin trouble we propose to consider.

Itch, Mange, Scabies

Swine in this country are not so often affected with true itch, due to a parasite similar to that which causes mange in other species, but it spreads rapidly when once it is contracted, owing to mites which reproduce with amazing rapidity.

Symptoms.—This skin irritation is so much more acute, and the animal so restless that the pig-keeper should be on his guard, and not mistake it for any of those comparatively mild annoyances to which allusion has already been made. The face is first attacked as a rule, and from thence spreads to the head, neck, withers, and in fact all over the body. The skin looks flea-bitten, watery matter escapes at first, but soon thickens by the inflammatory action caused by rubbing, and differs little from pus or matter. The parasites, no longer caring for the matter, remove to fresh places, and the old ones scab off and leave wrinkles and superficial scars, and the hairs fall out.

Treatment.—Swine are very susceptible to poisons applied to the skin, and the advice given to use sheep dips and coal-tar preparations should not be acted upon unless limited areas are treated and great care exercised. Sulphur is a specific for the itch, and can be used as an ointment in the proportion of 1 oz. of the flowers to half a pound of lard. If the pig to be dressed has a very sore surface, the grittiness of this preparation is a trouble, and a better dressing may be found in the so-called liver of sulphur or sulphurated potash in the proportion of 1 oz. to 1 qt. of water with 1 oz. of glycerine added. Tobacco juice, on which the duty is not exacted, also answers well, and should be diluted with twenty times

its volume of water. Remedies are often blamed because the disease recurs, but this is due to fresh hatches, and whatever medicament is chosen it should be repeated in a week or ten days to ensure destruction of new parasites before they are capable of reproduction. The piggery or sty must also be treated, or a few pregnant females will restock the animals and all the work has to be done over again.

Breeding Troubles

Those who buy pigs just weaned escape the majority of troubles, for these are connected with reproduction. On the other hand, the sow that brings two good farrows a year is the most profitable animal to keep. Some of the difficulties may be considered here. The custom of putting very young gilts to the boar if he is not of suitable size may lead to internal injury. Sow pigs of four or five months will steal a leap from a boar no older than themselves, when a broken one has been left, or for some reason an uncut pig may be running with them. No great harm may be done if generous feeding allows for both growth and pregnancy, but the offspring are seldom so good as when the sow is allowed to grow to eight months before service, or longer if she is not well developed and a good thriver. This may be overdone, however, and a fat gilt will have greater difficulty in parturition than a poor one. It is also more difficult to give manual aid when required.

Abortion

The fruits of conception are sometimes lost by casting of the pigs or abortion, or premature birth. While not so susceptible to nervous influences as some species of domesticated animals, the sow is nevertheless liable to abort if frightened by dogs or worried by railway travelling and shipment to strange quarters. A diet too forcing, such as beans or barley meal, is sometimes the cause of abortion by the indirect manner of causing indigestion and colic. Constipation from unsuitable food leads to straining, and this may influence the womb to the extent of bringing on premature labour. Frosted roots and other things which give rise to flatulence are among the worst provocations to abortion. Gilts or yelts are perhaps more liable to abort than sows that have produced several farrows. Abortion is more often overlooked in swine than in other animals, as it occurs early in the pregnancy as a rule, and the sow eats the pigs and the cleansing or placental membranes, and there

is little or no evidence of anything having happened, although the pig server may have noticed the animal to look a little less full than usual. A smallholder of our acquaintance recently refused £9 each for three gilts which proved to have all aborted, and a winter's keep in times of high prices of offal was lost. Steady feeding that keeps the sow in fair but not fat condition and an avoidance of anything likely to cause indigestion is the most likely means of avoiding abortion.

Treatment.—This is seldom necessary beyond a fast, if the sow has consumed the pigs and placenta. If she shows feverishness and refuses food next day, a gentle aperient of oil should be given, and a diet of thirds and water until the bowels are somewhat relaxed. If the bearing shows swelling and a more or less black discharge she will need syringing with a disinfectant, for which nothing is more suitable than a solution of permanganate of potash 2 scruples, in a pint of warm water.

Difficult Labour

Disproportion between the size of the foetus and the genital passage makes the expulsion of the young a difficult matter. One of the causes is too much fat on the part of the sow, but disparity in the parents is a more common one, and overfeeding during pregnancy. Without any such errors of management it may nevertheless happen that a small gilt will have few pigs and large in size. It may be necessary to give manual assistance to the parturient sow, but this should not be afforded until it is quite evident that she is striving without any progress, or in danger of becoming exhausted and ceasing to exert herself, or the involuntary contractions known as labour pains become weaker and ineffective. Then assistance must be given, or the animal is likely to lose her life. She should be approached with kindly tones and a gentle manner. The hands of the accoucheur should be first washed and the nails pared back, and it is desirable to use a disinfectant upon them, although this is commonly neglected. It is often possible to discover some little obstruction which can be removed, such as a pigling with chin down, or one leg forward and another back, and to bring it into line. A turned-back head, or a cross presentation, needs some skill to rectify, but with patience can generally be managed. Breech presentations offer considerable difficulty, as first the foetus must be got into the right direction and then the hips offer projections. If the feet can be secured there is a good towing line, but it is easy to dislocate and pull off a hind or a front leg if too much violence is

used. The unborn pig is very soft, and failures occur through relying on a string or single cord round a limb; but the most frequent accident is that which follows too much strain on the lower jaw, it simply breaks away, and whether the creature is delivered alive or not, is "done for". A large button-hook thrust into the mouth and turned round may sometimes be used with success in removing the pig, but when much force is required the youngster is generally sacrificed out of consideration for the greater value of the mother. After the successful extraction a rest should be allowed. The hand should not be inserted to ascertain if another foetus is presented, as its presence excites labour pains when a period of quiet would favour recuperation; indeed, the temptation is ever present to do too much, when waiting would be the better policy. It does not follow that because one pig has been jammed or delivered with difficulty that the next will present any special obstacle to birth. A cross presentation may take place even with a roomy old sow, whose other pigs will be shot out with so much force as to cause them to turn a somersault. Careful observation makes a good accoucheur, and the man with small and narrow hand has considerable advantages. Boys of an age to enter the parturient chamber can often be made of use if the small hand is directed by the old head. Shepherds' boys, who have assisted in the lambing pen, we have found valuable assistants, if not in fear of a fierce old sow, which may injure a man at other times or be dangerous after she is farrowed; but speaking as a veterinary surgeon with much experience of parturition, the writer has rarely indeed met with any resentment at his presence in the sty when actually needed for delivery.

Retention of the Afterbirth

Sows generally clean without difficulty, but in a few the contraction of the neck of the womb is so sudden as to enclose a part of the placental membrane, and keep the whole of it from coming away. They are not in the mood to be handled a great deal when fresh farrowed, and much rough interference provokes them to eat the piglings. The gentler sort may be syringed out and some degree of traction exerted upon the membranes; or with one of uncertain temper, we may succeed in noosing on a weight to the extruding membranes while the sow is at the trough engaged in eating something she particularly likes. Guile rather than force is to be used with swine, although we are compelled to resort to the latter at times.

A Cleansing Drench

Probably most sows are the better for the so-called cleansing drench, and certainly those with retained placental membranes should have it. The following has been long approved by leading pig-breeders: Sulphur flowers, 2 oz.; melted dripping, 1 lb.; skim milk, 2 qt.; boiling water, 3 qt. A pint of meal is stirred into this, and it is offered in a bucket or shallow trough. This dose is recommended for sows that have been on dry food more or less, or have shown constipation, as a desirable laxative a day or so before farrowing as well as a post-parturient or cleansing medicine.

Milk Fever

Milk fever in the sow usually takes the form of coma or of paralysis. She becomes dazed and is apt to crush her pigs in blundering down in a manner indicative of brain intoxication, which it really is. Some toxin in the udder gains access to the general circulation and affects the sensorium chiefly. It is not so fatal as in the cow, but often leads to the loss of the farrow, if it is not recognized and the young taken away and temporarily provided for.

Treatment.—For both forms of milk fever it is desirable to get a free action of the bowels, and the earlier the mixture of castor and linseed oil is offered, the more likely is the patient to take it voluntarily in a little meal or wet bran. If refused, she must be drenched. The paralytic condition so common in this disease rather favours the attendants in controlling a big strong sow, but drenching forcibly is always a thing to be undertaken with care, and the more so when an animal is not fully conscious, choking or getting some of the drench “the wrong way” being a serious risk. In view of this risk veterinary surgeons often use hypodermic injections, which present no greater difficulty than the needle-prick which is likely enough to be disregarded by an animal in a semi-comatose state; but such refinements of medication will not be available in the piggery of the owner. He can, however, adopt some of those artifices referred to elsewhere in this section. A copious clyster of soap dissolved in warm water, and passed slowly into the rectum, will seldom be resented by the sow, and is calculated to relieve the pressure and soothe the uterus after its contractions, and favour the action of the dose of oil or other aperient given by the mouth. With the emptying of the digestive canal comes relief to the head symptoms, but paralysis often remains.

The sow need not be despaired of, and it will help her to allow the pigs to suck if some one remains in attendance to see that she does not fall on them in futile efforts to get on her feet. If they are penned within sight of her she derives some satisfaction, as they do, and the maternal instinct is kept alive in the event of her recovery soon enough to bring them up. As topical remedies we may use a weak liniment, such as equal parts soap liniment and water, rubbing this into the loins and hams and the joints with moderate friction, night and morning. Strong oils or other applications should not be employed, as they soon blister and make sores, and do not effect the purpose. The toxin which gave rise to the disease seems to be eliminated from the body more quickly by giving small doses of salicylate of sodium, such as 10 gr. night and morning for the first three days, and at night only after that time has elapsed. The partly paralysed sow should be turned twice a day when rubbed with the liniment, and, if able to get on her front feet while sitting on her hams, should be assisted by a round towel passed under the belly, far back. A man on each side may enable her to rise and make a few faltering steps with their assistance. Each time this is done an improvement will be noted. We are convinced that many sows might be saved by this timely aid, which if left in a helpless state eventually succumb to digestive or lung troubles through remaining too long prone. Doses of 2 to 10 gr. of powdered nux vomica in the food, help to restore the paralytic after a week of the above treatment, and when symptoms of fever have passed away. In the case of delirium or great excitement preceding the paralytic condition, 1 dr. of chloral, or 2 dr. of bromide of potassium, may be given in the form of an electuary on a piece of flat wood, or an old wooden spoon; or if the sow is secured it may be smeared along the inside of the cheeks without risking one's fingers or the spoon. Such brain and spinal sedatives are, however, only useful for the time, and it is upon the action of the aperient that we must rely for a diversion of blood from the head to the bowels.

Fever in the Feet

As a sequel to metritis or inflammation of the womb, or following milk fever, intense lameness is sometimes observed, the hoofs being too painful to stand upon, and the sow keeping a recumbent posture, often attributed to obstinacy. The hoofs are liable to come off in severe cases, but this disaster need not prove fatal, or cause her to be killed, as they will grow again, though not in such good shape, if she can be cared for and turned, and, in a word,

properly nursed. Poulticing allays pain in the feet, but it is very difficult to keep anything on the feet of a pig.

Mammitis or Garget

A great many sows suffer from this disease, and receive very little attention as a rule, because the mammæ are separate or in water-tight compartments so to speak, and the loss of a gland or two does not prevent the sow from suckling an average farrow on her remaining sound quarters. A hard bag should be fomented, and rubbed with camphorated oil, and an aperient dose given, as there is no disease in which temperature runs up so fast as in garget, and many illnesses of young pigs, ascribed to other causes, are really due to the milk of a feverish mother. Something like half the sows one observes in going about the country have defective udders as shown in the elongated or enlarged quarters by comparison with the rest. Abscesses form and break if not lanced, and the animal suffers much pain and loss of condition.

Actinomycosis of the Udder

Many of the knots and kernels and abscesses in sows' udders are caused by the entry of the ray fungus which causes "wooden tongue" in cattle, or actinomycosis as above named. The long and pendulous udder of the sow lends itself to scratches and abrasions from brambles; and the ray fungus on the awns of grasses and cereals thus finds an open door. It multiplies and forms those tumours alluded to above as knots, &c. They can be cured, if taken in time, by iodine dressings from the outside, and the internal administration of the same drug. A cheap and satisfactory preparation may be made by dissolving together 6 dr. of iodine, with 4 dr. of iodide potassium, in 9 oz. of methylated spirit of wine. This should be syringed into the fissures, or the broken udder as it is, and two teaspoonfuls mixed with the food daily for an average sow, but more may be given to the large whites.

Sore Teats

Thin-skinned young sows suffer a good deal from sore teats, either as a result of the pigs' teeth; an eruption similar to but not a true pock; or from getting chapped in cold weather when left wet by the young. Lying on bad floors and dirty litter contributes to the trouble, which is less often seen in warm weather. Sore

teats make bad mothers, and it is important to ascertain and remove the cause. The sharp nippers of the young pigs can be broken off with forceps or with ordinary cutting pliers or pincers, without injury to the piglings. For eczematous eruptions, or sores already caused by the teeth, a lotion of one part borax in fine powder, and two parts glycerine, and four of water, may be applied with advantage twice a day.

Castration

The pig is the easiest of the domesticated animals to emasculate, and the great majority are operated upon by amateurs, or else by gelders where spaying of sows is also practised. The custom of most districts is to emasculate at about six weeks old if the farrow have prospered, then after a week or more in which to recover, the pigs are sold to go away, or drafted off to release the sow and allow her to come in season again, which she usually does in a few days after the milk is thrown back upon her and the demand ceases.

There are several ways of holding pigs to be cut, and much needless pain and squealing endured for want of a proper method. Pigs to be castrated should be shut off from the sow for a few hours previously, as a comparatively empty belly favours the restraint necessary, and reduces the risks of rupture and inflammation. The farrow should be separated from the sow, and cornered close with a hurdle or other barrier, so that a helper may easily lean over and lift out by the hind legs each pig as required. The neglect of these simple precautions leads to waste of time and the hustling in and out of broken sties, and heating and frightening of the victims, the worst conditions possible for a surgical operation, and not calculated to sweeten the temper of the gelder, who performs the work for a small fee, and without regard to the time occupied. A convenient attitude for the operator is that with his back to the wall, while the subject is presented to him held by the hind legs, and with its back to the gelder. The latter takes the body of the pig and thrusts it between his own knees, where he grips the animal behind the ears so that it is firmly held but cannot bite him. The helper retains his hold of the feet, bringing them down and sufficiently wide apart for the operator to have room to manipulate the scrotum or purse. This he does in an upward direction, squeezing first one testicle and then another against the skin and investing membranes, so that the wrinkles in the purse are disposed of, and the organ can be felt and its outline clearly

defined. With a knife, which is conveniently carried between the teeth and already opened, he then cuts boldly down on the tense skin covering the testicle. The beginner is warned to cut down forcibly or "boldly" as we have said, as one good incision causes much less pain than two or three feeble cuts which fail to release the organ. The good operator does not heed having cut into the testicle itself as well as through the skin and investments; he will squeeze the organ through the opening and grasp it, then pull with moderate force, and first divide the back portion with one slash of his knife, and next the front or more vascular portion. A little strain or a twist or two before dividing this part is advisable in hot weather, or in the case of pigs that have been hustled before being caught, as hæmorrhage is less likely to follow. When both testicles have been taken the animal is released, and seldom does the castrator take any precautions against septic infection. Pigs are largely immune to dirt diseases as they are called, and the careless custom here referred to so seldom brings in its train any penalty that precautions taken on particular farms are laughed at—by those who know no better. In some districts where swellings and fever follow, and where joint ill is not confined to pigs unweaned, it is worth while using the green castrator's ointment, for which a formula will be found in another part of this work. The castration of boars that have been used for breeding is deemed by some to be necessary and not by others. The flesh is comparatively worthless in an old animal because there is a strong smell and flavour. When fat and converted into bacon this is not so observable, but in any case it is third-rate stuff in the market. Castration of the adult is, of course, a more serious operation, and a good deal of time spent grazing and on a low diet is desirable if the boar is to be denatured before putting up to fat. Whether it pays or not to do this depends somewhat upon the time and place and circumstances of the farmer, who must decide for himself. Securing the animal is the chief difficulty. More than one noose should be employed, in case of one being bitten through or breaking away. It should be passed behind the tushes of the upper jaw, and not the lower, which may break under great strain. The upper one cannot well do so, although a powerful boar will break his teeth in a chain when used for the purpose. If the head is drawn up to a post quite close, he is powerless to get away, and the usual tying up and trussing is not necessary. The intending operator will have provided himself with clams and a hot iron in readiness, and when once the animal is made fast by the head, will have no difficulty in getting at the scrotum, laying open and pulling out the testes one by one

and placing the cords, one at a time, in the teeth of the clams, closing upon it, and searing off with a rather dull iron; sealing up the mouth of the artery with another, and, if needful, using a little powdered resin if he finds on slacking the clams slightly that there is a disposition to spurt blood. Having removed both testicles, he gives a liberal dressing of the green ointment both within and around the edges of the wounds. No further treatment is necessary if the incisions have been large and in such a position as to favour drainage. Low down they should be, for the reason just given.

Many pig owners succeed in hacking out the testes of most farrows without having tried to improve on the rough methods they have copied, but they fear a broken pig, as one is called that is ruptured in the scrotum. There is very little difficulty or danger in the operation on broken boar pigs, except that the site chosen for the incision is not favourable to drainage.

The testicles should be squeezed up into the perineal region or that just under the anus. A small incision, more in the nature of a stab than a long cut should be made, only just big enough to squeeze out the organ, which is then divided in the usual way. With a little manipulation the second testicle can be got through the same orifice, as only a thin septum or division separates them in the purse. A couple of stitches are then put in, and the animal liberated. The subsequent swelling and the hold of the stitches is sufficient to prevent the bowel escaping. The stitches may be left to die out.

Spaying

This operation for the making neuter of female pigs is still largely practised in the south-eastern counties of England, but has fallen into desuetude in most other districts. The necessity for it scarcely exists when we remember the market there is for small jointers in all large towns and the facility for getting pigs there, before rutting is an objection. However, the custom is endorsed by many good authorities, and is permissible by law, a High Court case having been taken by the R.S.P.C.A., who tried to put down the practice (*Lewis v. Fermor*). Spaying is done at the same time as castration of the males, and the men who do it may be considered very skilful operators. No person without efficient teaching and practice upon dead animals should attempt this delicate operation. The spaying of sows when they have done breeding, or keep on coming to boar without result, comes under the same category as the emasculation of old boars. Certainly it must be said that all animals deprived of the essential organs of reproduc-

tion fatten better, that is to say, make a larger return in a shorter time for the food consumed, than do entire, whether male or female. The spaying of old sows and the castration of old boars should be done under the influence of an anæsthetic.

In concluding this chapter on diseases of swine, one would wish to warn owners against the ignorant prejudice which induces men to give medicines by pouring them into the ears.

Worms

Swine are specially prone to parasites and of many kinds, especially when young. The round worms (*Ascaris suilla*) are the greatest depredators, and the embryos are taken in from the teats of the sow very early in life. The greatest preventive is that of washing the udder and teats, and dressing with a mild disinfectant just before farrowing. Santonine and jalap and calomel, followed by castor oil, will evict them. The dose must be estimated by the age and weight. Turpentine is also a good remedy, and for older swine can be administered in food if the meal is mixed with only a few drops until the animals become accustomed to the odour, when a medicinal dose will be taken in a morning feed, after a 15-hours fast. This remedy is also effective for tapeworms and more or less inhibits the multiplication of the threadworms which cause husk.

All worms passed should be burned, bedding destroyed, and floors and drains disinfected.

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CHAPTER V

BREEDS OF POULTRY

By BESSIE L. JONES, N.D.D.

FOWLS

In days gone by Britain possessed but two breeds of fowls—the Dorking, which is supposed to have been introduced by the Romans, and the Old English Game, which was bred by our forefathers for fighting purposes. Gradually, Britain imported the most popular breeds of other countries; many of these she improved, and many new varieties and breeds of proved utility she has evolved from the existing breeds, and to-day no other country possesses a finer collection of useful breeds of poultry. It is true that the utility properties of some of these breeds have been ruined through breeding for exhibition purposes. Fanciers, no doubt, do good in the poultry world by preserving the colour and type of a bird, without which we could not easily distinguish one breed from another, but they also do a great deal of harm by breeding for what may be called the dictates of fashion. This is usually the case when they breed for the excessive development of any particular feature, whether it be the comb, feather on the legs, length of leg, or any particular marking of feathers. These eccentricities of fanciers are not essential to preserve the type of a bird; in many cases they may have the reverse effect, and they invariably have a deteriorating influence upon the utility properties of the breed. Some of the best breeds of poultry have been produced in America. Being noted throughout the world for their love of utility, the Americans have considered this characteristic a *sine qua non* in all their breeds of poultry, and American-made breeds are thus distinguished for their all-round useful qualities. Care is also taken in that country to preserve the utilitarian properties of their birds from being deteriorated by breeding for fashion. Great Britain, although she has evolved only one new breed, is responsible for many varieties of the existing breeds. Many of the latter, however, are only kept by fanciers, and have little value from a utility point of view.

The only modern breed produced in this country is the Orpington, of which there are several varieties. These varieties, however, may be regarded as distinct breeds, as in most cases their origin has been quite different, although all bred to the same type.

The French have for many years specialized in the production of table poultry, with the result that all the breeds from France are chiefly noted for their table properties. In that country, poultry flesh is used to a greater extent as an article of diet than in England, and the French are willing to give good prices for high-class birds. High prizes are also offered for the best table fowls, and this has encouraged the breeding of that class of poultry. Moreover, the French take their poultry-keeping much more seriously than the British, and few birds are bred solely for fancy purposes. The French breeds, with the exception of the Houdan and the Faverolle, are very little kept in Britain. They are, as a rule, rather delicate, and do not attain the same degree of perfection as table birds in this country. They seem to miss the rich fertile valleys and the warm climate of their native country. The Faverolle is an exception, but this breed possesses a good deal of English blood, the Dorking and the Brahma having been employed in its evolution.

CLASSIFICATION

Fowls are usually classified according to their economic properties, and the classes usually distinguished are:—

1. Laying or non-sitting varieties.
2. General-purpose varieties.
3. Table varieties.

The first class consists mostly of the smaller breeds originally belonging to the Continent. They are non-sitting, and usually lay a white-shelled egg. These breeds are summer rather than winter layers, but this fault can be mitigated to a certain extent by hatching out chicks early enough to produce pullets, which will start laying in October, when they will continue to lay throughout the winter months. These have been called the laying breeds, but in these days of egg-laying competitions we find the premier place very often taken by a breed from the general-purpose varieties. This is no doubt due to the fact that great care has been bestowed on the selection of birds for breeding for laying purposes with these varieties.



Photo. Sport and General

ANCONA COCKEREL

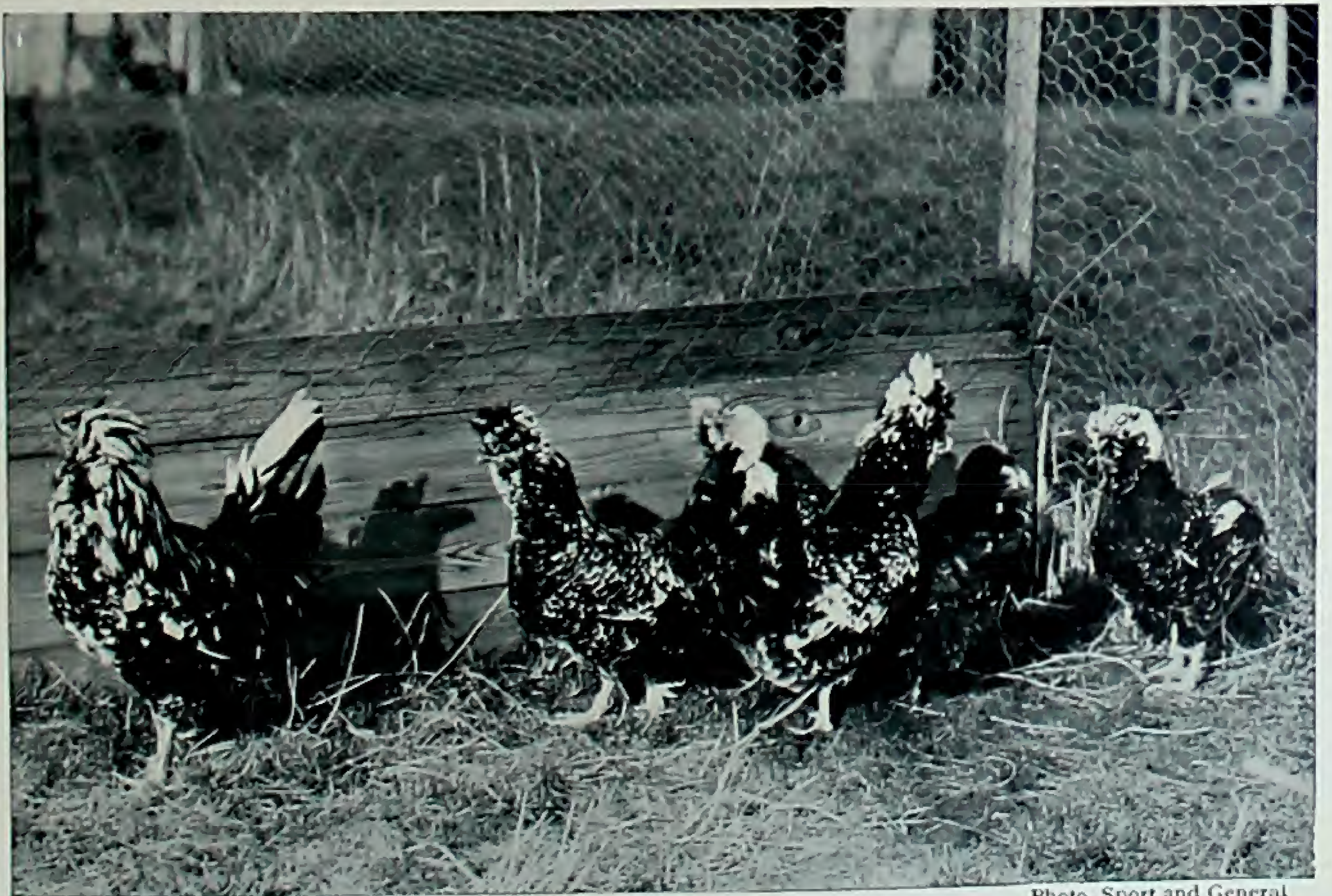


Photo. Sport and General

HOUDANS



Photo Sport and General

SILVER-SPANGLED HAMBURG COCK



Photo. Sport and General

SILVER-SPANGLED HAMBURG HEN

Most of the non-sitting varieties make poor table birds, therefore the farmer who keeps these breeds can only expect small prices for the surplus cockerels and the hens after they have finished their laying period. On the other hand, they are small eaters, and the hens give a good return in eggs for the food they consume. They are excellent breeds for cottagers who have little ground of their own but who can allow them free range.

The general-purpose varieties include those breeds which are good layers and at the same time make fair table birds. They are perhaps the most useful breeds for the average farmer, who does not, as a rule, specialize in either egg or flesh production. They are the best varieties for winter egg production, due to the fact that they are frequent sitters. Their eggs are usually of a good size and are tinted in shell. These are very important factors to be considered in the choice of a breed, for eggs are of much greater value from the end of September to the end of February, and large brown eggs always have a ready sale. The hens of these varieties are good sitters and mothers, and a high price can be got for the old hens as broodies in the beginning of the year. The general-purpose varieties also make good table birds. Throughout the country there is a constant demand for a good-sized chicken, not necessarily of the best quality or one which has been specially fattened. This demand is supplied by fowls from the general-purpose varieties, and they usually sell at a figure which leaves a fair margin of profit to the farmer.

The table varieties and their crosses are usually kept by poultry keepers who specialize in the production of high-class table poultry. In the first-class markets the demand is for a fowl carrying a large amount of flesh upon the breast. The flesh should be white in colour, of good flavour, soft and juicy, and covered with a white skin. The fowls reared for this trade are usually brought to a high state of perfection by being artificially fed, and it is not every breed of fowls that takes kindly to this operation. Another demand of the trade is for white legs and feet, and fowls possessing these characteristics along with white skin are regarded as almost perfect for table purposes. However, this is only a market idiosyncrasy, for in France, where the rearing of table poultry has been brought to a fine art, the breeds used usually possess black or slaty-blue legs and feet. Fowls with coloured legs and feet have always been looked upon in this country with disfavour for table purposes. It is, however, pleasing to note that the prejudice against yellow legs and feet is lessening in our London markets. This is perhaps due to the fact that some of the best cross-bred table fowls have legs of that

colour. The table varieties consist of those breeds which are best calculated to produce fowls which will meet the requirements of our first-class markets. As a rule, the hens are indifferent layers, but are good sitters and mothers.

NON-SITTING VARIETIES

Ancona

This breed really belongs to the Leghorn tribe, but it was introduced into England long before the Leghorn, and consequently people did not connect the two breeds. When first introduced it was believed to be the result of crossing Black and White Minorcas. Since the introduction of the Leghorn, however, it has been found that the Ancona possesses more or less the characteristics of that race of fowls, and it is now assumed that the Ancona originated from that family. It is surmised that in the neighbourhood of Ancona, in Italy, there has been a general mixing of Black and White Leghorns, producing a breed of certain definite markings which is known in Italy as Mottled Italians. This breed is very similar to our Anconas, and it is highly probable that they are one and the same breed.

The Ancona is an excellent layer of medium-sized eggs. It is very hardy and vigorous, and will thrive in very cold exposed districts, being, in fact, one of the hardiest breeds that we possess. It is very active, an excellent forager, and therefore costs very little to keep. The chicks are easy to rear, quick growers, and very precocious, the pullets often laying at from four to five months old. The Ancona, like the Black Leghorn, is very wild in its habits, and therefore does not do well in confinement. Like all the members of the Leghorn family, it is not a good table fowl, but as a layer it can hardly be surpassed. The Ancona used to be a great favourite with farmers, but for some years its popularity has been on the wane. About 1900, in order to satisfy a new standard introduced by fanciers, Minorca blood was infused into the breed. The "New Style Ancona", as the resulting bird was called, is larger in size and more uniform in colour and different in carriage. But it is not such a good layer, neither does it possess the hardy active characteristics of the "Old Style", and the change is much to be regretted from a utility point of view.

In general conformation the Ancona resembles the race of fowls known as the Mediterranean family, which comprises the breeds belonging to Italy and the Spanish Peninsula. These

breeds have all the following characteristics: a fairly light longish body; medium length of neck and legs; a large single evenly-serrated comb, which stands upright in the cock and hangs to one side in the hen; white ear-lobes and long pendent wattles.

The plumage of the Ancona is beetle-green black, with white markings, more or less irregular in the "Old Style". It has yellow legs mottled with black.

Andalusian

These fowls were imported into this country from Spain about the middle of the last century. They were then known as Blue Spanish and sometimes as Blue Minorca, as they were similar in appearance to these two breeds, which had also come from the Spanish Peninsula. They resemble, however, the Minorca more than the Spanish, as they do not possess the excessive development of ear-lobe so peculiar to the last-named breed.

The Andalusian, like all non-sitting breeds, is a summer rather than a winter layer. Like the Minorca it lays a very large-sized egg, but it is not so prolific as that breed. It is not very hardy, and thrives best in dry sheltered situations. On this account it has never been a great favourite with farmers. The chicks are difficult to rear, being slow in growing and feathering. The hens also take a longer time than the hardier breeds to get through the moulting period. It is a poor table bird, being small in size, and when old its flesh is apt to become dry. In type the Andalusian is very similar to the Minorca, but it has a more upright carriage. It possesses a head and comb peculiar to the Mediterranean family. The comb is large, single, and stands upright in the case of the cock, but falls over on one side in the hen. The colour is slaty-blue inclining to black over the thighs and breast of the cock and the body of the hen. It is very difficult to breed Andalusians true to colour. About 50 per cent only of the chicks are blue, 25 per cent being black, and the other 25 per cent being speckled white. However, if the "sports" are mated together (i.e. the Blacks and the Speckled Whites), 100 per cent of slaty-blue chicks are obtained. This tends to show that the Andalusian is a "cross" rather than a pure breed. The Andalusian is not a great favourite with the utility poultry keeper, and is drifting more and more into the hands of the fancier.

Campines

This is a very old race of fowl, and was imported into this country from Belgium. In 1898, in a report of a tour in that country, Mr. Edward Brown wrote in glowing terms of the wonderful laying qualities of this breed. As a result it was introduced into this country, but although popular for a few years it has now more or less developed into a breed for fanciers. It derives its name from that strip of country extending from Antwerp to Hasselt, and the breed is a great favourite in that country, where it is bred chiefly for its laying properties. The hens are remarkable layers of good-sized eggs. At one time the eggs were very small, but by careful selection and breeding the eggs have been improved in size, and now weigh on an average about 2 oz. each. The Campines are hardy, but they do best on light soils. They are active, and being splendid foragers cost very little to keep, but they don't do well in confinement. They are not good table fowls, being too small in size, but the chickens when killed at eight weeks old are very plump and of good quality. The chicks are hardy, feather quickly, and are easy to rear. The pullets commence laying at from five to six months old. In type the Campines resemble the Hamburgs, but they have a large single serrated comb, which stands upright in the male and inclines to one side in the female. In plumage they resemble the pencilled Hamburg, but the pencilling in the Campine is broader. There are two varieties, the Gold and the Silver. Another breed closely allied to the Campine and no doubt descended from the same ancestry is the Braekel. This breed is chiefly found in Flanders, and the fowls are bigger in body than the Campines, due no doubt to the fact that they are bred on richer and moister soil. The Braekel is a splendid layer, and the eggs are of a rich flavour. The chicks are hardy, easy to rear, and mature very quickly. They are best killed at from six to eight weeks old, when they are very fleshy, and are greatly in demand in the Belgian markets as *poulets de lait*.

Hamburgs

This is the most prolific layer of all the breeds, but the eggs are too small in size to be of much market value. The breed comprises five varieties, namely, Black, Gold Spangled, Silver Spangled, Gold Pencilled, and Silver Pencilled. It seems to have originated in Holland, and probably takes its name from Hamburg, the port

from which it was imported into England. The Black and Spangled varieties have existed in Lancashire and Yorkshire for over a hundred years. They were called Mooneys and Pheasant fowls, and for some time were thought to be a distinct breed. They possess all the characteristics of the Hamburgs, which goes to prove that they have originated from a common stock.

The Hamburgs when imported into England were known as "Dutch Every-Day Layers", and it must be admitted that they are worthy of the name, for it is not uncommon to find specimens of the breed producing 250 eggs per annum. Their eggs, however, are very small in size, only averaging about $1\frac{1}{2}$ oz. in weight, and for this reason Hamburgs are not largely kept as a utility fowl, Leghorns having taken their place. They are active, hardy, and will thrive almost anywhere, but do not do well in confinement. They are small in size, and are not much good as table fowls. The Hamburgs are very beautiful in appearance, especially the Gold and Silver Pencilled varieties. They possess a neat head with a rose comb having a long spike pointing backwards in the direction of the body. The cock carries a very fine flowing tail. The plumage of the Gold Spangled has a ground colour of golden bay, the feathers being fringed with a round black moon; whilst the Gold Pencilled variety has the feathers marked across with bars of black. In the Silver varieties the ground colour is steel-grey. The Black and Silver Pencilled are the best varieties for practical poultry keepers, as they lay larger-sized eggs than the others.

Houdan

This breed was imported into England from France about the middle of the nineteenth century, and was until the introduction of the Faverolles the only French breed to attain popularity in this country. The Houdan is supposed to have originated from a cross between the Crèveœur (another French breed) and the common five-toed fowl. Like the Dorking this breed possesses five toes, which tends to show that the two breeds have a common origin. The Houdan might be called a general-purpose fowl, for besides being a good layer it is also a splendid table bird. It has been said that the Houdan is a poor winter layer—all non-sitting breeds are—but when suitably fed, properly housed, and provided with shelter the Houdan can be relied upon to produce a fair number of eggs during the winter months. To produce winter-laying pullets the chicks should be hatched about the beginning of April, as they

usually start laying at six months old. The Houdan is not a very hardy fowl. The head is surmounted by a large crest, which retains the water in rainy weather and makes the bird liable to take cold and so renders it delicate. Fanciers have done the bird further harm by increasing the size of this crest, so the best specimens for utility purposes are those which possess the smaller crests. On dry soils, however, and in warm situations the Houdan can be thoroughly recommended, for as a good layer and combining superior table qualities it is hard to beat. The chicks are easy to rear and grow very quickly. They are fine in the bone, easily fattened, and carry a large amount of breast meat, which is of a very high quality. They have also white flesh and skin, and a clean, pinky leg; all these qualities meet the market requirements of a first-class table bird. In appearance the Houdan is a large square-shaped bird, with a well-developed breast, and short, thick legs and neck. The distinctive features are the crest and comb, the latter being more pronounced in the cock, and is said to resemble a butterfly with its wings open. They also carry a beard and muffs on both sides of the head. The plumage is glossy green black and white evenly mottled. For crossing purposes the Houdan is a very valuable breed, and there is a great demand for cockerels for that purpose. One of the best laying crosses is the Houdan-Leghorn, and the fowls are much better for table purposes than the pure Leghorn, and much hardier than the pure Houdan. Very good crosses for table purposes are the Houdan-Dorking, Houdan-Faverolles, and the Houdan-Indian Game.

Leghorn

The Leghorn family is the most widely known and the most important of the non-sitting breeds. The Leghorns take their name from the town of Leghorn, in Italy, where they originated. About the middle of the nineteenth century they were imported into America, where they were improved almost to perfection. About 1870 they were introduced from that country into Britain. About that time only the White and Brown were known, although the Blacks must have existed in Italy. Since then other varieties have been evolved, namely, Buffs, Piles, Duckwings, Cuckoos, and Mottled. The Whites, Blacks and Browns are the only varieties that can be recommended to the practical poultry keeper; the others have almost entirely passed into the hands of the fancier. The White Leghorn is a splendid layer of fairly large eggs of a white colour.

It is a very valuable breed for the farmer, for it is a splendid forager, and produces eggs at a very small cost to its owner. It is extremely hardy, and will thrive in the most exposed parts of the country. The chicks are easy to rear, mature early, and feather easily. If fed properly the pullets can be depended upon to lay at six months old. It is quite common to find pullets laying at from four to five months old, but this early maturity should not be encouraged as the fowl will not prove so profitable later on. The Leghorn is a great favourite in the United States of America, and along with the Wyandotte and the Plymouth Rock used to represent nine-tenths of the breeds kept in that country. Lately, however, it has been supplanted by the Buff Orpington. It is also a great favourite in Australia, where it has produced wonderful egg records. The Leghorn is of little use as a table fowl. It is small in size, carries very little flesh, and has yellow skin and legs. Consequently the great drawback to the farmer who keeps this breed is the disposal of the surplus cockerels. These cannot find a ready sale in our first-class markets, and can only be disposed of at an unremunerative figure.

The Leghorn has the characteristics peculiar to the Mediterranean family. It has a stately carriage and an upright gait, and presents a vigorous, active appearance. Within recent years exhibitors have been breeding, especially with the White Leghorns, for increased size of body and a larger and more fleshy comb. From a utilitarian point of view this has had a deteriorating effect upon the breed and cannot be too severely condemned. It has weakened its constitution, reduced its laying powers, and the large comb has led to wholesale dubbing. Poultry keepers when choosing a strain of White Leghorns for utility purposes should avoid this modern type and secure a strain of the older and more useful kind. The Black Leghorns came to us direct from Italy, and are believed to be of pure Italian blood. They are very hardy, often roosting in the trees with no apparent bad results. They are rather wild in their habits, the hens sometimes being unapproachable. They are splendid layers, but the eggs are of a smaller size than those of the White Leghorns. They are very active and splendid foragers, and are worthy of greater attention from the utility poultry keeper.

The Brown Leghorns were imported into this country from America at the same time as the White Leghorns. They were at that time in great demand as laying fowls, and fresh importations were made from Italy. For some time they equalled the Whites as layers, but breeders started crossing them with the Indian Game

to improve their colour and that reduced their laying properties and now they are becoming more and more a fancier's fowl.

Among the best crosses with the Leghorn are the Wyandotte-Leghorn, the Plymouth Rock-Leghorn, and the Houdan-Leghorn. The first two are great favourites with the farmer, for they are splendid layers, and produce more eggs in the winter time than the pure Leghorn. The chicks are also quick-growing, and the surplus cockerels make good table birds when the colour of the flesh is of no great consequence. The Houdan-Leghorn cross makes one of the best layers, and a fair table bird. Hens of the White or Black varieties should be used for preference for crossing purposes.

Minorca

The Minorca fowl was introduced into this country about eighty years ago. It takes its name from the island of Minorca, where no doubt it originated, although it seems to have been imported into England from Spain. For many years it was bred almost exclusively in the south-western counties of England. There it reached a high state of perfection, no doubt due in part to the fact that this fowl requires a more sheltered district than some of our hardier breeds. About thirty years ago the breed suddenly sprung into public favour, and became well known all over Great Britain and also to some extent in America. Its popularity, however, has declined with the farmers, due no doubt to the breed being unable to adapt itself to cold and exposed districts. The Minorcas are still, however, great favourites with the poultry keepers who have only a small run or garden in which to keep their fowls, for being black in colour they always present a respectable appearance even on an earth run. They also stand confinement well, are non-sitters and very prolific layers. When the size as well as the number of eggs produced are taken into consideration, the Minorca is undoubtedly one of our most valuable breeds of poultry. The eggs weigh on an average about $2\frac{1}{2}$ oz., and many eggs weigh as much as 3 oz. Like all the non-sitting varieties, the Minorca is a summer rather than a winter layer, but chickens hatched in April may be depended upon to lay throughout the winter. In order to make the Minorca a profitable breed, it is important that it should be kept in a sheltered and sunny position, for it will not thrive in a cold exposed district. As a table fowl it is not very good, but it is better than most of the non-sitting varieties, and ranks next to the Houdan. It is larger in size than the Leghorn, and carries



Photo Sport and General

WHITE LEGHORNS



Photo. Sport and General

PLYMOUTH ROCKS



Photo Sport and General

BLACK MINORCAS

a fair amount of breast meat, and when well fed the cockerels make fair table birds. The hens are not very active in their habits, but they have a quiet contented disposition, which no doubt accounts for their suitability as a breed for confined spaces.

The Minorca has the Mediterranean characteristics, which have already been described. There are two varieties, the Black and the White, but no attempt will be made to describe the White in this chapter, as it is very little known and is not such a useful variety as the Black. The Black Minorca is dense black in colour, with black legs as well, and the cock carries a large flowing tail. It is to be regretted that in the Minorcas as well as in the Leghorns some strains have been spoiled by breeding for increased size of comb. It has also been noticed that the birds reared in the north and north-east of this country are larger in size and longer in the leg than an average specimen of the breed, but the original small type is by far the more profitable fowl.

For crossing purposes the Minorca is very valuable, especially for improving the size as well as the number of eggs. A few cocks of this breed mated with a flock of nondescript hens will in a season or two produce splendid laying fowls. A well-known cross is the Langshan-Minorca. This produces a very hardy fowl, a good layer, and it is a cross that has done well in most parts of the country.

Redcap

This breed is chiefly found in Derbyshire and the south of Yorkshire. It is supposed to have originated from a cross between the Gold Spangled Hamburg and the Old English Game. It takes its name from the characters of its comb, which is red in colour, not unlike a rose in shape, and closely resembles a cap. The hens are very prolific layers, the eggs being larger than those of the Hamburgs and of a good marketable size. They are hardy and seem to do best in hilly districts. For winter laying the chickens must be hatched early, as the pullets do not commence laying until they are from seven to eight months old. It pays to keep a Redcap for three years and even longer, as it retains its laying powers until it is five or six years old. This cannot be said of any other breed. The chicks are very hardy and easy to rear. At four to six months old they make good table fowls, the flesh being white in colour and of very good flavour. The Redcap is altogether a very useful breed, and its good qualities deserve better recognition than they receive at present by farmers.

In appearance the Redcap resembles the Golden Spangled Hamburgh, except that it is much larger in size and the comb more exaggerated. The comb, which is the distinctive feature of the breed, should be oval in shape, and covered with fine long spikes, with one long thick spike projecting out behind. The ear-lobes should be red instead of white, as in the case of the Hamburgh. The ground colour of the plumage is bright red chocolate, and the spangling, which is bluish-black in colour, is crescentic and not moon-shaped. The hen has a black tail, and her hackles and neck are red striped with black. The cock has a black breast and tail, and his saddle and hackle feathers are dark red, striped with black. The Redcap is a valuable breed for crossing purposes, and will improve the laying properties of almost any flock.

Scotch Grey

This is a very valuable fowl for the utility poultry keeper, but it has neither been a general favourite nor has it gained much popularity in Scotland where it originated. It has been called the Dorking of Scotland, but it is hardier, stands more upright, and is a much better layer than the Dorking. It may have originated from that breed, for it has long been in existence, and at one time the Dorking and the Game were the only two breeds found in the British Isles. For economic qualities it could be classified as a general-purpose fowl, but the hens are non-sitters. They do become broody at times, but cannot be relied upon to hatch eggs. The hens are good layers of large-sized eggs, which are pale cream in colour. Little or no attention has been paid to the selection and breeding of these fowls for egg production, and no doubt their laying properties could be improved considerably if this were done. They are very hardy, active, good foragers, small eaters, and will thrive in cold damp and exposed situations, but they do not stand confinement well. The chicks are easy to rear, but do not grow very quickly. They make splendid table fowls for they possess very fine-grained meat, but owing to their slow growth the flesh is not as soft and tender as could be desired, still, it is very juicy and of good flavour. It is a breed that can be strongly recommended to the farmer, and it deserves better recognition than many of our newer-fashioned varieties which have been greatly boomed. The Scotch Grey is a homely-looking bird; the plumage has a ground colour of pale greyish-blue, evenly barred with a dark metallic blue. The face, including the ear-lobe, is red, and the comb is single, of

medium size, standing upright in the cock and leaning slightly to one side in the hen. The carriage is upright, somewhat intermediate between a Game and a Dorking.

Spanish

About forty years ago this breed was a general favourite, now it is only kept by a few exhibitors, and it has even become useless as a fancy fowl. It is supposed to have been introduced into England in the days of Philip of Spain, when the two countries had much intercourse with each other. It possesses a white face instead of the red found in nearly all our other breeds of fowls. It is indirectly due to this peculiar feature that its popularity has gone. Originally the face of the Spanish was of normal size, but fanciers decreed that it should be developed in length, and at the same time rendered coarser in appearance. Everything was sacrificed to bring about these changes. The birds were kept under artificial conditions, with the result that excessive development of a coarse white face was produced, but the constitution was ruined and the utility qualities spoiled. At one time this breed was a great favourite with farmers, who often kept the cocks in order to improve the laying qualities of their poultry yard. At that time the Spanish hens were prolific layers of large-sized white eggs. In general appearance the Spanish resembles the Minorca, except in the colour of the face, which is white. It also possesses a larger ear-lobe, but it is not so massive or compact in the body as the Minorca.

The plumage of the Spanish is black, with a metallic-green beetle sheen, and the legs are slaty-blue. It has a tall upstanding carriage and a proud motion. At present it can only thrive where special care is bestowed upon its management. The chicks are difficult to rear, very slow in growth and feathering, and the hens present a most rugged appearance during the moult. It is a regrettable fact that such a valuable utility breed has been allowed to fall into such disrepute.

GENERAL-PURPOSE VARIETIES

Brahma

Before the boom in poultry caused by the introduction of the Cochin into this country was over, the merits of the Brahma became known. It was introduced into America about the same time as

the Cochin was imported into England. For some time many authorities believed the Brahma to have been descended from the Cochin, and a great controversy arose as to the real origin of the breed. It is now recognized as an Asiatic breed, and quite distinct in origin from the Cochin. The breed was imported into England from America about 1853, and for a long time after its introduction was very popular with the farmers, and what is known as the barn-door fowl of to-day is more or less descended from the Brahma. When first introduced it was a great favourite with the utility poultry keeper, and much more so than the Cochin. In America they are still extensively used for crossing with the Dorking and French breeds to produce good Christmas table poultry. In that country the breed still maintains its original and more useful type, whilst in this country it has been bred by the fancier for increased size of hock for the purpose of extra amount of feather on the body and legs. This has resulted in the ruin of its economic qualities, and it is now practically only kept in this country for exhibition purposes.

The Brahma, when first introduced, was one of our best winter layers, but to-day, with the exception of a few profitable strains, the hens are very indifferent layers. The table qualities seem to have suffered less in the hands of the fancier. It is true that increased size of hock has produced less flesh on the breast, and the profuse feathering has rendered the meat coarser, but coarse flesh was always a fault of the breed.

The Brahma carries very little meat in proportion to its size, but it is exceedingly hardy, and the eggs are of a rich brown colour. It has a very deep, square-built body, broad short back, and the breast is carried well forward. The head is very small and neat, and carries a "pea" comb. The comb consists of three ridges compressed together, the middle one standing a little higher than the other two. The legs are well developed, especially the hock, and are covered profusely with feathers. There are two varieties, the Light and the Dark. The plumage of the Light Brahma is pure white, with black tail and foot feathers. The neck, which is silvery-white, has a dense black ridge running from the centre of each feather. In the Dark Brahma the breast, wings, hocks, under parts, and foot feathers of the cock are black, whilst the neck, saddle, and tail are of the same colour as the White Brahma. In the hen the ground colour is all dark, with a silver-white pencilling.

Cochin-China

This is the most famous of all our breeds of poultry, although at present it is only kept by a few fanciers. It was introduced into England from Shanghai about the year 1846. It was first exhibited in Birmingham about 1850, and it was so much admired by the general public that the "poultry mania" of the middle of the nineteenth century was the result. Even *Punch* caricatured and wrote about the new birds; and it was due to the popularity of this breed that the show system of this country became a success. Before the introduction of the Cochin any poultry show organized was looked upon with contempt. Although the day of the Cochin is over, it still lives in many of our present-day favourite breeds. The Buff Orpington, Wyandotte, and Plymouth Rock have all been evolved by the use of the Cochin. When the Cochin-China was first imported it was a useful fowl, but not to the extent to warrant the phenomenal popularity which marked its introduction. At that time the hens were excellent winter layers of fair-sized brown eggs. They were also extremely hardy, and grew to a very large size. From the very beginning the Cochin was a favourite breed with fanciers, and in a comparatively short time they succeeded in ruining the breed for all utility purposes. They bred for profuseness of feather on the legs as well as on the body, and sacrificed everything to gain this end. Although the Cochin grows to a great size, it does not make a good table fowl. The flesh is inclined to be coarse, and the proportion of breast meat is very small. The drumstick has been developed into a huge size, and although the quality of this meat is inferior to the breast flesh, it is supposed to be much more juicy than the drumsticks of other breeds. The Cochin is still used for crossing, and when suitably mated they produce useful table fowls of good size and quality. The Cochin hens are very much given to broodiness, but on account of the great profuseness of feathers on the legs, they make neither good sitters nor mothers. They are enormous eaters, and give very little return for the food they consume.

In appearance the Cochin is a broad, massive bird, with a short back, neck, and tail. The head should be neat, nicely curved, with a small single comb of fine texture. The wattles and ear-lobes are of a bright-red colour. The plumage is loose, fluffy, and soft, making the bird appear much larger than it really is. The thigh and legs are large and strong, and covered profusely with feathers.

Faverolles

At present this is the most popular of the French breeds in this country, on account of its extreme hardiness. It originated in the northern part of France, and was imported into England about 1896. The Faverolles was produced by crossing the Brahma, Houdan, and Dorking. Various varieties of these three breeds appear to have been used promiscuously, with the result that many different coloured Faverolles have been formed, but they all conform to the same type. The favourite variety in this country is the salmon-coloured. This hardly describes the colour, for the cock is more or less like the Silver Dorking, and the hen resembles the Wheaten Game in colour. The Faverolles was bred to produce good layers—especially in winter—and strong, quick-growing chickens which would make profitable fowls, and for these two purposes the breed can be strongly recommended. The hens are good winter and spring layers, and readily adapt themselves to different climatic conditions. The eggs are of average size and of a pale-brown colour. The hens are also good sitters and reliable mothers, and not subject to over-broodiness. The chicks are extremely hardy and easily reared, and they do best when they have plenty of open space, as they are splendid foragers. They mature quickly, and are pre-eminently suitable for the spring-chicken trade, for at four months old they are ready for the table. At this age they are heavier and plumper than the Dorking, but eventually the chicken of the latter breed attains greater weight. The Faverolles possesses white flesh and legs. The birds are fine in the bone, carry a large amount of flesh, and can adapt themselves readily wherever necessary to artificial fattening. They are great favourites in Surrey and Sussex, where chickens are reared for the high-class markets of London. The Faverolles is in great demand for crossing with other breeds for table purposes. The Faverolles cock, when mated with Dorking, Buff Orpington, and Sussex hens, produce table chickens of excellent quality. The Indian Game-Faverolles cross compares very favourably with Indian Game-Dorking, for the Faverolles hens are much earlier and better layers than the Dorking, and the chickens are hardier and quicker in growth.

Faverolles fowls have a long, thick, deep body, with a broad breast, and a very deep, prominent keel-bone. The legs are of medium length, stout, and straight, feathered sparsely on the outside. The head is broad flat, and short, without a crest, but

adorned with a muffing and beard. The comb is single and free from coarseness. In plumage the cock and hen are dissimilar. The neck, saddle, and hackles of the cock are of a straw colour, whilst the beard, muff, and breast are black. In the hen the neck and head are of a wheaten-brown striped with a darker brown colour. The back and wings are also of a wheaten-brown, but the colour gradually gets lighter on the sides and becomes creamy-white, which is the colour of the breast, thighs, muff, and beard.

Langshan

The Langshan was imported into this country from China in 1872. It was introduced by the late Major Croad, and there is still a type of the breed known as the Croad Langshan. The question as to the origin of this breed led to a great controversy between two sections of its admirers. This discussion was anything but friendly, and the popularity of the Langshan suffered in consequence. This breed, although not largely kept by utility poultry keepers, has exercised an economic value in the poultry world, for about 1886 the late Mr. William Cook, recognizing its utility value, evolved from it the Black Orpington. The Langshan is an excellent winter layer; the eggs are somewhat small in size, but are of a rich brown colour. There are two distinct types of Langshans, namely, the Croad, which is the older and more or less the original type, and the Modern Langshan. The Croad Langshan has a longer body, is much shorter on the leg than the modern type, and is a better bird for general purposes. The Modern Langshan was produced soon after the introduction of the Black Orpington. Langshan fanciers, in order to make the breed as distinct from Black Orpington as possible, commenced breeding them for length of leg. They succeeded only too well, but in so doing they ruined the economic properties of the bird. This modern type is much longer in the leg, coarser in bone, flesh, and skin, and carries less meat on the breast. Langshans grow to a great size; the adult cocks usually weigh on an average about 10 lb. The hens are good foragers, but also do well in confinement, and, like the Minorca, are specially suitable for back-yard poultry keepers.

In general appearance the Langshan is a tall, upright bird, with wide shoulders, and deep, long breast carried well forward. The head is small, with bright, intelligent eyes, and carried well back. The comb is single, of moderate size, and the face, ear-lobes, and wattles are red. The legs are of a dark-slate colour, with feathering

down the outer side, and also on the centre of the two outer toes on each foot. The plumage is black, with a rich beetle-green gloss upon it.

Orpington

At the present time the Orpington is the most popular of all the breeds of poultry. Not only is it popular in this country, but it is fast gaining ground in Canada and the United States of America, where it is supplanting the White Leghorn.

There are five varieties of this breed—namely, Black, Buff, White, Spangled, and Cuckoo—all of which were produced by the late Mr. William Cook, of Orpington, Kent, from which town they have derived their name. Although the five varieties are known as Orpingtons, none of them have the same origin, and are therefore really distinct breeds, and as a matter of fact each of them possesses its own club. In producing these varieties, however, the originator aimed at a common type, and although the component parts of the different varieties were very diverse, he succeeded to a very high degree in breeding all his Orpingtons to the same conformation.

The first variety produced was the Black, which was formed by crossing the Black Plymouth Rock hens with a Black Minorca cock, and then mating the progeny with the Langshan. In appearance the Black Orpington is very similar to the older type of Langshan, but it has no feathers on its legs. It is a good layer, and the eggs are larger in size than those of the Langshan, but not so deep in colour. The birds are hardy and vigorous, and, having a contented disposition, they are suitable for keeping in confinement as well as at liberty. The chicks are hardy, easy to rear, but slow in growth. Their table properties are quite satisfactory, they carry a large amount of breast meat, and the skin and flesh are white in colour. They are, however, difficult to fatten at an early age, on account of their lateness in maturing. They are best fattened at from five to six months old, when they make splendid table fowls.

The hens are quiet, and make good sitters and mothers, but they are apt to become broody too often. In some strains this is more pronounced than in others, and recently much has been done by careful selection and breeding to overcome this fault.

The Black Orpington presents a compact, massive appearance, with an erect carriage and graceful style. The body should be broad, deep, full, and carried well forward, the back short, and the shoulders broad. The legs should be short, strong, and free from

feathers. The neck should be gracefully curved, the face and earlobes red, and the head small and neat, with a single comb of medium size. The tail should be of medium length, and inclined backwards. The plumage should be close, of a black colour, with a greenish sheen.

Buff Orpington

The Buff Orpington was introduced into the poultry world about 1890, and very soon surpassed the Black in the public favour. William Cook said that he produced the breed by crossing a coloured Dorking hen with Golden Spangled Hamburg cock, and then mating the pullets of this cross with a Buff Cochin. Another account of its origin is that it was produced by selection of a certain type of birds from the Lincolnshire Buffs. This last is an old breed found in Surrey, Kent, and particularly in Lincolnshire, and is said to have been the natural evolution of a cross between the farm-yard fowl of the Dorking class and a Buff Cochin. These two versions regarding the origin of the Buff Orpington may account for the lack of uniformity in the economic qualities of different strains of this breed. Some strains are splendid layers, and in many egg-laying competitions they have carried off the premier honours, while other strains hardly lay enough eggs to pay for their keep. This may be said of any breed of fowls, but it applies to the Buff Orpington to a greater extent than to any other. Speaking generally, the Buff Orpington is a good winter layer of medium-sized eggs. It possesses white flesh, white legs and feet, and lays a brown-shelled egg—a rare combination—which undoubtedly has helped to make the breed so popular with the average poultry keeper. If properly managed it is quite a suitable breed for confinement, and some strains are good foragers when at liberty. The hens are quiet, good sitters and excellent mothers, and in the early months of the year there is a great demand for them as brooders, when they realize very good prices. They cannot, as a rule, stand heavy feeding, for, not being very active in their habits, they are prone to put on internal fat. On this account their laying properties are impaired, and at the same time they are rendered very liable to liver disease. The chicks are hardy, easy to rear, but are rather slow in developing. When fully matured they make good table fowls, for they grow to a large size and carry a large amount of breast meat of good quality. The cockerels sell best when they are about five months old. Although the breed is fairly hardy, it does not thrive in cold, damp situations, but does

much better on dry, sandy soils. In order to rear pullets to lay during the winter months the chickens should be hatched in February and March, as they do not, as a rule, commence laying until they are from seven to eight months old. In general appearance the Buff is very similar to the Black Orpington, except in colour, which usually varies from a lemon shade to a rich buff; in any case the colour should be uniform.

White Orpington

This variety is considered by some authorities to be a "sport" from either the Black or Buff Orpington, while others state that it has been produced by crossing together White Leghorn, White Dorking, and Black Hamburgh. It was introduced about 1892, and within recent years it has gained much popularity, and is fast becoming a serious rival to the Buff. The White Orpington is now largely kept by farmers, utility poultry keepers, and fanciers not only in this country, but also on the Continent, in America, and South Africa, and experts are prophesying that it will soon outstrip the other varieties as a general-purpose fowl. The hens are splendid layers of large-sized brown eggs, and can always be relied upon to lay during the autumn and winter months. The birds make better table fowls than the Buff, for they are finer in the bone, mature earlier, and fatten more easily. In cold, damp situations they also thrive better than the Buff, and the hens are not so often broody as those of that variety. They possess white-coloured flesh of very good quality.

Jubilee Orpington

This is another variety which was introduced in 1897, and was originally known as the Diamond Jubilee Orpington. The same economic properties are claimed for this as for the other varieties of Orpington, but nevertheless it has never become popular with the utility poultry keeper, and is more or less a fancier's fowl.

Spangled Orpington

The Spangled is very similar to the Jubilee Orpington, but is smaller in size, and is considered a better layer; in fact, it is claimed to be a better layer than all the other varieties. The plumage is black, spangled with white. It was introduced about 1900, but it is not largely kept, except by fanciers.

Plymouth Rock

This is an American breed, and was imported into England about 1878. It is believed to have originated between a Cochin, Dominique, and Black Java. The last two mentioned are old American breeds of good utility value. They have never been very popular themselves, but have been very useful in the formation of some of the most valued American breeds of poultry. They are now very little kept, having been supplanted by the newer breeds which they created. The Plymouth Rock used to be a great favourite in this country prior to the introduction of the Buff Orpington. In America it is still a great favourite, and is more largely kept in that country than any other breed. The Plymouth Rock is a very profitable fowl, and one which can be strongly recommended to the average farmer. As layers the hens compare very favourably with the Orpingtons, although they have never figured very prominently in egg-laying competitions; still, they lay a good number of brown-shelled eggs of average size, and are excellent winter layers. They are very hardy, and can adapt themselves to almost any conditions. They stand confinement well, are active in their habits, and are splendid foragers when at liberty. The hens also are quiet, and make good sitters and mothers, and are not so often broody as the Orpington. The chicks are very quick growers, and easy to rear. At from twelve to fifteen weeks old they are ready for the table. In this respect they are equal to the crosses of either the Dorking or Houdan. The Plymouth Rock is the largest of our general-purpose fowls; the cocks average about 10 lb., and the hens about 9 lb. in weight. It is yellow in the flesh, skin, legs, and feet, but this feature does not enhance its value as a table bird in our best markets. This defect might have been bred out by careful selection, but in America yellow-coloured flesh is considered a good quality in a table bird, and the meat of birds possessing this characteristic is considered more juicy and better flavoured than that of white-fleshed fowls.

The original Plymouth Rock is known as the Barred, so called because the plumage, which has a ground colour of greyish-white, is evenly barred with bluish-black. Two other varieties have been derived from the Barred, namely the White and Black. These varieties are both useful fowls, but have never attained any great degree of popularity, due no doubt to the fact that too many breeds of fowls are already in existence.

Buff Rock

This variety does not seem to have originated directly from the Barred Plymouth Rock. It contains undoubtedly a great deal of Cochin blood, and probably the Leghorn and the Brahma have also taken part in its evolution. At one time this breed appeared to be becoming very popular, but the introduction of the Buff Orpington which possesses many of its characteristics prevented this from being realized. The Buff Orpingtons at once won the public fancy and are now bred by the thousands, whilst the Buff Rocks have only become favourites with the few poultry keepers who have kept them for some time, and from experience have learned that they possess economic qualities of a high order. Comparing the Buff Orpington and the Buff Rock from a utility point of view there is not very much to choose between them. The former possesses white skin and legs, which makes it more suitable as a table fowl in this country, but the latter is a much better winter layer and a hardier breed. The Buff Rock hens are more active, better foragers, and are not so persistent sitters as the Buff Orpington.

In spite of the yellow skin and legs the Buff Rock makes a good table fowl, for the chicks are fairly quick growers and make good birds for the table at a much earlier age than the Buff Orpington. Buff Rock pullets take from about seven to eight months to mature, but if hatched in March they will commence laying in November, and will continue throughout the winter even during the coldest weather. The hens are good layers and can compare favourably with any other breed. In an egg-laying competition recently conducted by the Utility Poultry Club at the Harper Adams Agricultural College, and extending over twelve months, the Buff Rocks were, for the greater part of the period, the leading pen.

Rhode Isle Red

The Rhode Isle Red has only recently been imported into this country from America. It originated in the island whose name it bears, where it has been bred for the last sixty years. The breed is said to be the natural evolution, resulting from the crossing of the various breeds kept on the island, viz. Malay, Cochin, Wyandotte, and Leghorn. For a long time it was bred simply for

utility and not to any artificial standard, for the inhabitants of the island wished to develop a breed that would produce eggs and table fowls as economically as possible, and judging from the popularity which this breed has attained as a utility fowl since it came to England they have been entirely successful. In 1888 a club was formed and a standard drawn up, and since then the Rhode Isle Red has been recognized as a pure breed, and now there are classes for it at most of the leading shows in England. The Rhode Isle Red is a very useful breed of fowl and one that can be recommended to the farmer. It is a good winter layer, and the eggs are of good size and reddish-brown in colour. It does not lay so many eggs as the Wyandotte and some of the other older breeds, but it might become more prolific if attention were given to the selection of the best-laying strains for breeding purposes. It is very hardy; the chickens grow very fast and are easy to rear. For winter-egg production the chickens should be hatched during March and April, for the pullets commence laying when they are about six months old. The hens are good sitters and mothers, but are not nearly so persistent sitters as the Buff Orpington. As table birds they compare very favourably with the Wyandotte, for they grow quickly, fatten readily, and for their size carry a large amount of meat. The cockerels are usually killed when they are from four to six months old, when they realize good prices as roasters. Fully-matured birds weigh from 5 to 7 lb.

In general appearance the Rhode Isle Red is longer in the body than the Plymouth Rock and less upright than the Wyandotte. The body should be long, wide, and deep, with a black tail and wing flights, and the legs and feet of a bright yellow colour. There is a Rose as well as a Single comb variety, but the former is not so popular as the latter, although the Rose is equally as good from a utility point of view. As a rule it is difficult to breed Rhode Isle Red true to colour, but considerable success has been achieved in this respect during the last few years without impairing its utility value.

Wyandotte

This breed was introduced into England about the year 1884, and it has been gaining in popularity ever since. At present there are nine varieties of this breed, but the original was the Silver Wyandotte. The Silver was first produced in America about 1873 by crossing the Cochin with the Silver Spangled Hamburg. It

was then known as Sebright Cochin or American Sebright. Under this name it never became popular and seems to have died out. About 1880, however, a similar fowl appeared under another name, viz. Wyandotte. This is said to have been produced by crossing the Hamburgh with the Brahma and then introducing a little of the Cochin-Sebright blood. The Silver Wyandotte so formed at once became popular, and the breed at present is more largely bred than any other. To account for this it may be noted that the Wyandotte is one of our best general-purpose fowls. It lays well through the year, and is the very best of our winter layers. The eggs are brown in colour and round in shape; they are rather small in size, but by the careful selection of breeding fowls this fault is being gradually overcome. The Wyandotte is very hardy and active, it is a splendid forager and yet does well in confinement. The hens make splendid sitters and mothers, and are not inclined to excessive broodiness. The chicks are easy to rear, quick in feathering, and mature early, the pullets are often laying when they are six months old. The Wyandotte has yellow legs and skin, therefore in this country it is not a great favourite as a table bird. In America, however, it is considered one of the best breeds for this purpose for it grows quickly, fattens readily, and carries a large amount of meat of good quality. It may also be termed an economical feeder, for it gives a good return for the amount of food it consumes.

The Wyandotte weighs from about 6 to 8 lb.; it has a compact body, a full round breast, and a broad short back. The face is red and the comb is of the rose variety, not standing upright like the Hamburgh but lying close to the skull and very low in front. The legs are strong, of medium length, and yellow in colour. The plumage of the Silver variety has a silvery-white ground colour, with a narrow edging of black on the body feathers of the hen, and on those of the breast and under parts of the cock.

The Golden Wyandotte was formed by crossing the Silver with the Rhode Isle Red, and was introduced into this country about 1888. It at once became a great favourite with poultry keepers, no doubt due to the fact, that besides being a good utility fowl it was also a very beautiful bird. It has a rich golden-bay ground colour instead of the white which we find in the silver variety. Fanciers, however, to improve the lacing of the plumage, commenced crossing with Indian Game, but in so doing diminished its laying powers.

The White Wyandotte was the next variety to be introduced. This is a "sport" from the Silver Wyandotte, and is undoubtedly

the best variety for utility purposes. It is a great favourite with farmers for it is a splendid layer and a good table bird. It is also largely kept by fanciers, and since it is of a uniform colour no inbreeding is necessary to maintain any special markings. On this account the hardy constitution of this variety has been ensured, as fresh blood can be introduced whenever necessary. The White Wyandotte is the best of layers, which may be accounted for from the fact that both in America and in this country it has been carefully bred and selected for that purpose. Consequently in many of the recent egg-laying competitions we find the White Wyandotte carrying off the highest honours. In addition it makes a very good table fowl, it grows quickly, fattens easily, and carries more flesh than any of the other varieties. It is a breed that can be strongly recommended to the farmer.

The Partridge Wyandotte is another popular variety. It was introduced into England about 1896. It is believed to have been produced by crossing Golden Wyandotte, Partridge Cochins, and Gold Pencilled Hamburgs or Indian Game. This variety is not so largely kept for utility purposes as the others. It is more of a fancier's fowl, but it is a very good layer. The Buff Wyandotte was produced in England by crossing the Silver Wyandotte with Buff Cochins, but the American Buff was formed by crossing the Silver Wyandotte with the Rhode Island Red. A merit claimed for this variety is that it lays larger-sized eggs than the others.

Other varieties are the Black, Blue, Columbian, and Silver Pencilled, but these are only bred by fanciers.

TABLE VARIETIES

Dorking

The Dorking is supposed to have been introduced into Britain by the Romans. To support this view it is pointed out that Columella, a Roman author, writing about the time of the Roman invasion, describes a breed of fowls carrying a fifth toe, and possessing other characteristics similar to the Dorking of the present day. We find no other records of breeds at such an early period possessing five toes, which tends to show that the Dorking may be connected in some way with the breed described by the Roman writer. Further, we find very old and distinct varieties of fowls in different parts of Britain, especially so in Cumberland, Westmorland, and the north-east of Scotland, which are almost in every

respect similar to the Dorking. Against this theory, however, we have to bear in mind that there is no breed which resembles the Dorking kept in Italy at the present day.

About a hundred years ago the breeding of Dorkings was confined to the counties of Sussex and Surrey, and it is from the town of Dorking, in the latter county, that the breed has taken its name. It is our best breed for table purposes, for it possesses all those qualities which go to make a first-class table fowl. It has the advantage of being an early layer, which enables chickens to be hatched early when prices rule high. The chickens are quick growers, feather easily, and at from twelve to fourteen weeks old they often weigh as much as 4 lb. each. The flesh is white in colour, and a large proportion of it is on the breast, with very little on the legs. The quality is excellent, being of good flavour, soft, and juicy. The skin is thin and transparent; the legs and feet are clean and white in colour.

The breed takes kindly to the fattening system. The hens are only moderate layers; the eggs, however, are of good size, but white in colour. The hens are also good sitters and excellent mothers, though their fifth toe is sometimes in the way when discharging their maternal duties. The Dorkings do not thrive in cold, damp, or bleak situations, neither do they do well in confinement. They require a free grass run, and must be kept clean and dry. Although the Dorking is in itself an excellent table bird, it has even a greater utility value when crossed with other table breeds, such as the Game. It is invariably a pair of half-bred Dorkings that carry off the premier honours at the Smithfield Show.

The Dorking is a large, massive bird; the body is broad, wide, and deep, and when viewed sideways it appears to be long and rectangular in shape. The head is large, with a single evenly-serrated comb, and the neck is short and thick. The legs are short, strong, stout, and round in the bone, white in colour, and carrying five toes. The thighs are large and strong, though not heavy, for the Dorking, as has been already pointed out, carries the largest proportion of its flesh upon its sternum and breast. A full-grown cock should weigh from 11 to 13 lb., and a hen from 9 to 10 lb.

There are four varieties of this breed, viz. Dark, Silver Grey, White, and Cuckoo. At one time there was another variety known as the Red Dorking. This was considered one of the oldest and most useful kind. The breeding of it was confined to the south-eastern counties of England. At present there are very few



Photo. Sport and General

LIGHT BRAHMA COCK

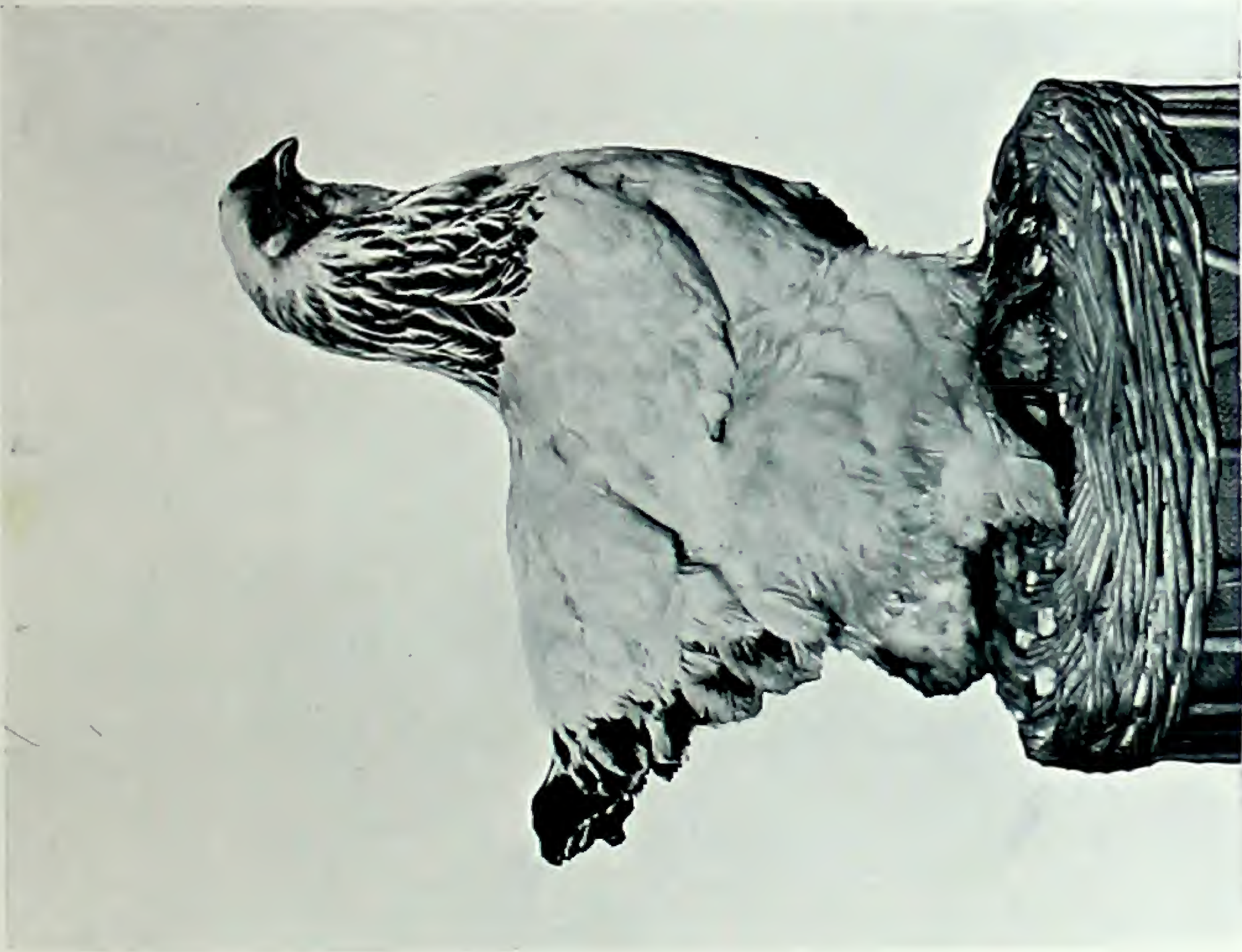


Photo. Sport and General

LIGHT BRAHMA HEN



Photo. Sport and General

BUFF COCHINS

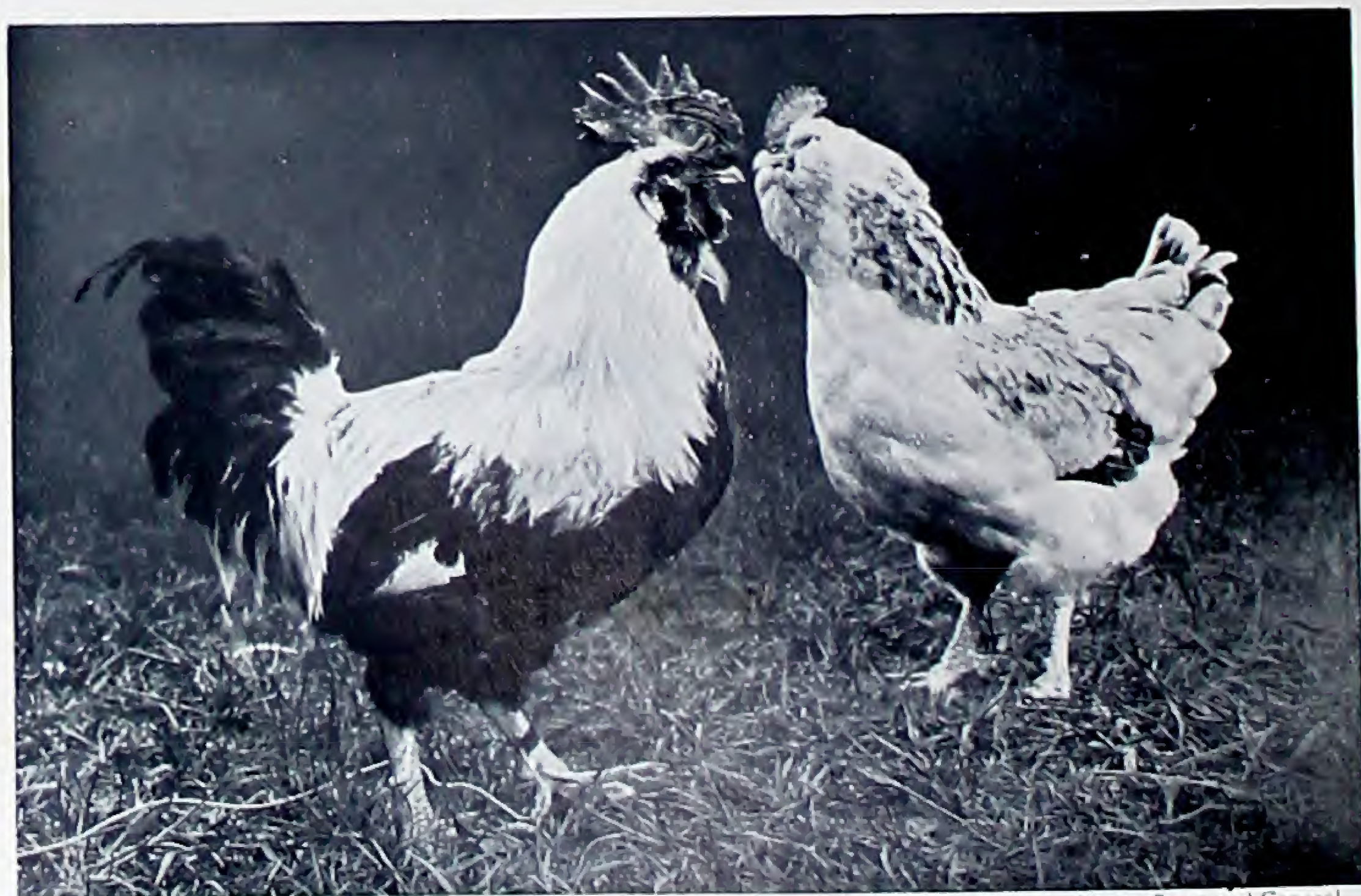


Photo. Sport and General

SALMON FAVEROLLES

specimens to be seen, and no doubt this variety has been merged in the Red Sussex, a splendid table breed, which shall be described later.

The Dark-coloured Dorking is the variety most largely kept, for it is larger in size and usually heavier than the other varieties. The Silver Grey is the most beautiful variety. It is lighter in the bone than the Dark, and, although smaller in size, it very often carries quite as much meat. It was this variety that was employed in the evolution of the Favorelles, one of the most useful of our modern breeds. The White Dorking possesses a rose instead of a single comb. It is smaller in size than the other varieties, and is more or less of a fancier's fowl. The Cuckoo Dorking is fast becoming extinct, but it may have had a share in the evolution of the Cuckoo Orpington.

English Game

It is much to be regretted that this old and valuable breed of fowls is so little bred at the present day. In earlier times this was the breed that provided sport for the rich and poor of many countries. Cock-fighting took place everywhere, and large sums of money were won or lost on the result. The sport was even introduced into the public schools, probably in order to instil into the youth of the country the indomitable courage and valour of the Game cock. In 1848 cock-fighting was prohibited, but as it is difficult to kill or stamp out a national sport by an Act of Parliament, cock-fighting was practised surreptitiously long after that date. For the purpose of fighting, the cocks were specially bred and fed, and our forefathers, when breeding and training the birds with that end in view, were at the same time unconsciously developing their wing and breast muscles, and thus improving their table qualities. After cock-fighting had lost favour, the breeders began to breed Game for exhibition purposes. To satisfy the fads of the fancier they gradually changed the type of the breed, and modern Game is quite unlike the old fighting breed of our ancestors.

The Old English Game had a stout, well-developed body, with powerful wings and legs, and a full, flowing tail. The modern exhibition Game has a tall and slender appearance, the legs are very long, and the body has been reduced in size. The neck has a drawn-out appearance, and the fine flowing tail has been reduced to what is called a whip tail; in fact, the Old English Game has been transformed. Lately, however, an effort has been made to

revive the older type, and it has met with some success. The Old English Game has great value from a utility point of view. It is a valuable breed for crossing purposes, and a cross between a Dorking and Old English Game produces one of the best and the most rapid-growing table fowl that it is possible to obtain. Any variety of table fowl crossed with the Game produces a fowl much improved in flavour of flesh, in rapid development, but perhaps not in size. The Old English Game carries more flesh in proportion to bone and offal than any other breed, and the meat, which is chiefly on the breast, is very fine in flavour. The hens are average layers, and first-class sitters and mothers. The chickens grow quickly, are splendid foragers, and are always in a plump condition. The hens are also very careful mothers, and will defend their chickens against all enemies, even cats and foxes. The birds do not attain to a great size, the average weight of a fully-grown cock is from 5 to 8 lb., and that of a hen from 3 to 6 lb.

There are many varieties of Game, viz. Black-breasted Red, Brown Red, Duckwing, Piles, Black, White, Spangled, &c. The Black-breasted Red is said to be the most useful of all the varieties.

The chief objection to the Game fowl is its pugnacious disposition. It is impossible to keep a large number of Game fowls together, for if there be more than one cock, fighting would take place, and one would be certain to kill the other. The fowls have an active disposition, and are excellent foragers, but they are not suitable for keeping in confinement.

Indian Game

This breed was evolved in Cornwall about the middle of the nineteenth century, and was for a long time known as the Cornish Game. It is supposed to have been produced by crossing the Black-breasted Red Game with an Indian fowl called the Ascel, and again crossing the progeny with the Sumatra, a black fowl of the Malay type. When first introduced it was used by the Cornish miners for fighting purposes, but it was too slow and heavy in its movements, and did not seem to possess the proper Game spirit.

The Indian Game, although recognized as a table breed, lacks many of the characteristics essential for that purpose. It is heavy in the bone, and therefore slow in maturing. The skin, legs, and feet are of a yellow colour, and the flesh is hard. However, it carries a large amount of flesh upon the breast, which is of a very fine flavour, and it grows to a large size. These qualities make it

a very valuable breed for crossing with the soft-fleshed races of fowls, and it is for this purpose that it is chiefly used as a table fowl. A cross between an Indian Game cock and Dorking, Sussex, Faverolles, or Houdan hens produces very large and meaty chickens. But as these grow to a large size, and are slow in maturing, they are more suitable for the autumn than the spring trade. The Indian Game, like all other table breeds, is a poor layer, but the eggs are of a deep-brown colour, and of a very fine flavour.

The Indian Game has a broad, thick head, a short, stout, well-curved beak, and a close-fitting pea-comb. It has a broad, thick-set body, with rather prominent shoulder butts, and a wide, deep breast. It has muscular wings and thighs, and the legs are thick and strong. Altogether it is a commanding and courageous-looking bird, and possesses a vigorous, sprightly carriage. A full-grown cock weighs from 9 to 11 lb., and a hen from 6 to 8 lb.

A breed of fowls not unlike the Indian Game is the Malay. It came to us from the Malay Peninsula, and is believed to have been evolved from the breeds which were employed for cock-fighting in South-eastern Asia. In general appearance it is similar to the Indian Game, except that it is broader, more muscular, and has a more ferocious expression. It has little utility value except for crossing purposes, and it is generally looked upon as a fancier's fowl.

The Ascel is another variety, and is considered by many to be the true Indian Game. It is the breed which has been employed for cock-fighting in India from time immemorial. It is shorter on the leg than the Indian Game and is much smaller in the body. It is a very poor layer, and has little value from a utility point of view, except for crossing for table purposes. It has an upright sprightly carriage and a very savage appearance.

Sussex

This is one of our oldest breeds of fowls, but it has only been recognized by the Poultry Club since 1903. It has been bred in the counties of Surrey and Sussex for many years, and is believed to be descended from the same stock as the Dorking, as both breeds possess many points in common and have originated in the same locality. Towards the end of the last century the Sussex was hardly known outside the counties of Surrey, Kent, and Sussex, and was in some danger of dying out and becoming extinct.

However, certain persons recognizing its superior table qualities, paid special attention to the selection and improvement of the breed, with the result that a great revival was created in the breeding of the Sussex fowls. Since then a Sussex Poultry Club has been formed, the breed has also been exhibited at many poultry shows, and now its popularity is fast spreading outside its own counties.

The Sussex is pre-eminently a table fowl, and it has been bred in its native district for that purpose for many generations. Surrey and Sussex are noted for the excellence of their table poultry. It may be also stated that these are the only counties in England which systematically adopt the "cramming" system in preparing their fowls for the London market. Perhaps this, along with the fine breed of fowls, accounts for the excellence of their table birds, for in all market reports the Surrey and Sussex fowls are quoted at a higher figure than those from other districts.

This breed, like the Dorking, possesses all the qualities which go to make a first-class table fowl. It has a large massive body, with a broad, long, and deep breast, fine bone, white flesh of good flavour and texture, together with legs and skin of a white colour. The chicks are hardy, quick growing, and very easy to rear. At three months old they are usually big-framed birds, and at that age they are ready for the fattening pen. They are much hardier fowls than the Dorkings. The hens are good winter layers, and the eggs are large in size and tinted in colour. There are three varieties of Sussex recognized by the Poultry Club, viz. Red or Brown, Light, and Speckled. The first has plumage of a rich red or brown colour, with black stripes in the hackle, a black tail and flights. The Light Sussex has plumage not unlike the Light Brahma, which indicates that Brahma blood has been employed at some time in its evolution. It has white plumage, and, like the Red, has black stripes in the hackle, a black tail and flights. The Speckled is black and brown in colour, with white tips to the feathers. This variety is declared by some authorities to be the original Sussex fowl. All the varieties possess a single erect comb of medium size; a red face; a broad, square body carried well forward; a long, deep breastbone; broad shoulders; tail of medium length; wings carried close to the body; and short, stout thighs and legs. When fully grown the fowls average from 7 to 9 lb. in weight.



Photo Sport and General

BLACK LANGSHAN COCKEREL

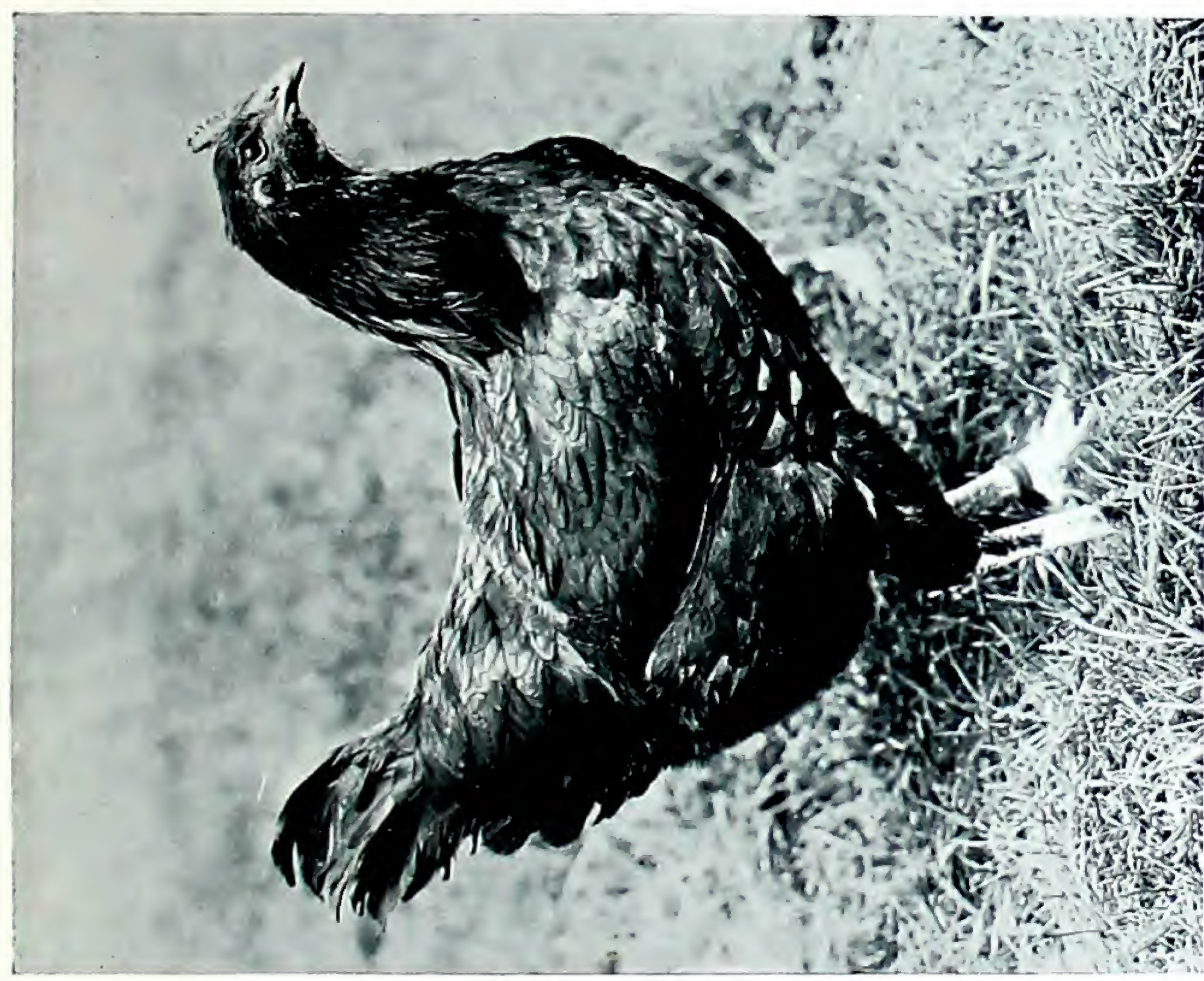


Photo Sport and General

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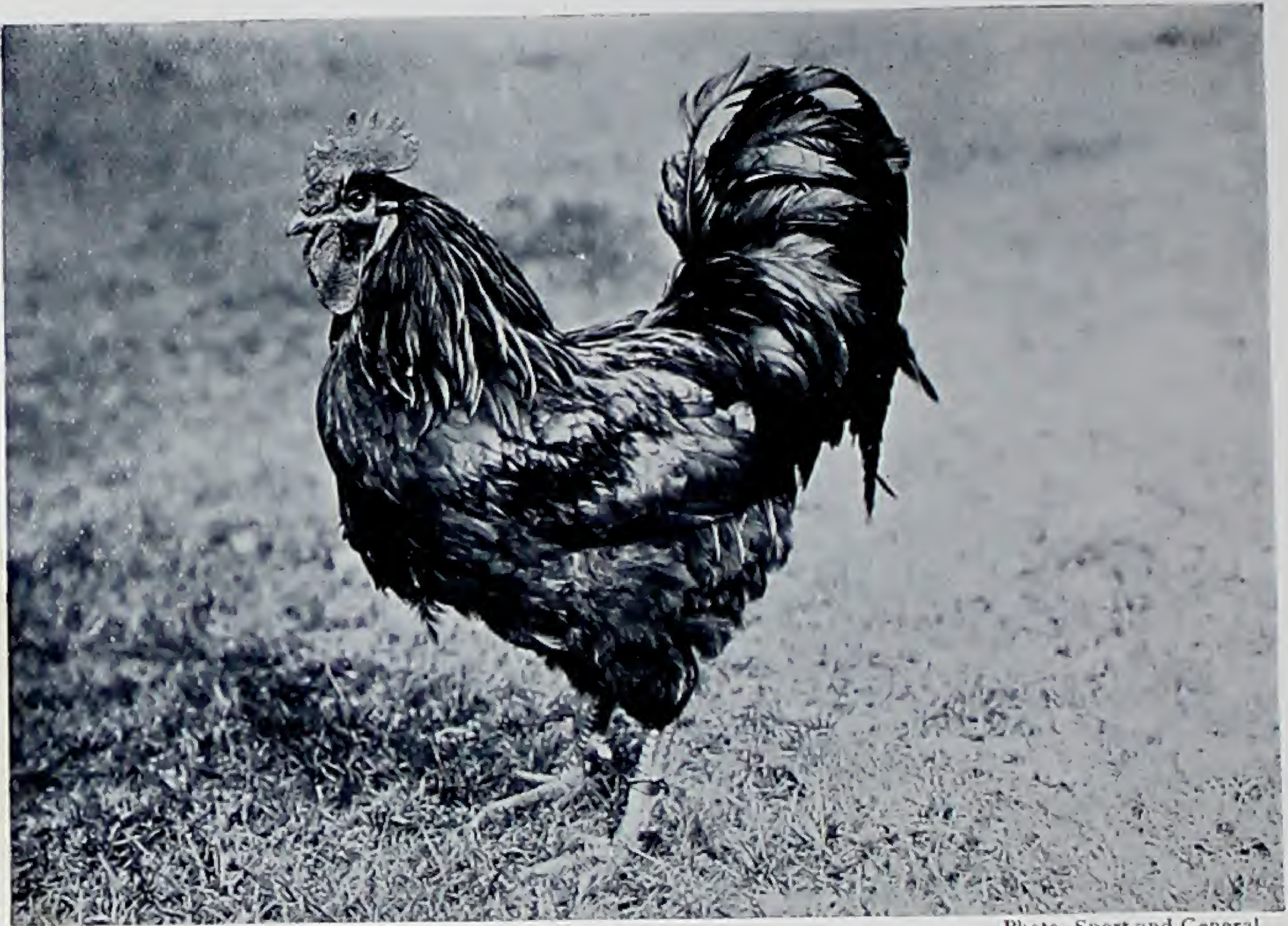


Photo. Sport and General

BLACK ORPINGTON COCKEREL



Photo. Sport and General

BLACK ORPINGTON PULLET

FRENCH BREEDS

Creve-cœur

The Creve-cœur is a native of Normandy, and was first introduced into this country about 1852. It is very delicate in constitution, and on this account it has never become popular in this country. Still, the Creve-cœur is a very useful breed of fowl, both for egg and flesh production. The hens are good layers of large-sized, white-shelled eggs, and they very seldom become broody. The chicks are quick in growth and grow to a great size. The birds carry a large amount of flesh upon the breast, and the meat is of excellent quality. In general appearance the Creve-cœur resembles the Houdan, but the body is larger and more massive. The large round crest on the top of the head is a distinctive feature; and the comb, which consists of two large coral-like horns, meeting at the base like the letter V, is also a special characteristic of the breed. The plumage is black, the legs are short, and of a dark-slate or black colour.

La Bresse

In France this is the most important breed of table fowls. It is bred chiefly in the Bresse country, which lies south of Burgundy, in the departments of Aisne and Saône-et-Loire. The general appearance of the Bresse suggests a laying rather than a table variety, for it is not unlike the Leghorn in shape, and at one time the two breeds are supposed to have been very closely allied. This must have been generations ago, for to-day the utility properties of the two breeds are quite the reverse of one another. The breeding of the fowls on the rich soil of La Bresse, the special selection of the parents for their table qualities, and possibly the introduction of a cross such as the Dorking, has produced an excellent table breed from a laying one. In size the La Bresse is not much bigger than the Leghorn. The cock, when in a lean condition, weighs from 6 to 7 lb., and the hen from 5 to 6 lb.

It is the excellent quality of its meat, the rapidity with which it puts on flesh, and the great weight it scales when specially fattened, which make it so popular as a table breed. It is also very light in the bone, another excellent feature in a table fowl. Well-fattened specimens always command very high prices, but judging from the amount of meat the birds put on such a small

framework this is not surprising. In general appearance the La Bresse, as already stated, more or less resembles the Leghorn, but the body of the La Bresse is much longer, and the legs and feet are blue-grey instead of yellow in colour. The comb is not so large as that of the Leghorn; the flesh and skin are very delicate and of a white colour. There are four varieties, viz. Black, White, Grey, and Blue. The last-named variety is almost entirely confined to France. As an egg producer the La Bresse is a good deal better than the average table fowl, and some years ago in an egg-laying competition conducted in this country a pen of La Bresse took the second place. The eggs are white in colour and above the average in size.

La Flèche

The La Flèche belongs to the La Sarthe department of North-west France. It is not extensively bred in this country owing to its delicate constitution. It is supposed to have originated from the Black Polish and Black Spanish, for it possesses the peculiar horned comb of the former, and the carriage, white ear-lobe, and black plumage of the latter. It used to be one of the fancier's best table fowls, but is now being supplanted by newer breeds. Its chief merit is the fine flavour of its flesh. It is rather slow in maturing, and is usually kept until it reaches the adult stage before being marketed. When fully matured and specially fattened it presents one of the finest specimens of table poultry. The hens are good layers, the eggs being of good size and white in colour.

DUCKS

Aylesbury

This breed takes its name from the Vale of Aylesbury, in Buckinghamshire, where it has been extensively bred for nearly a hundred years. In that district a great duck-raising industry is carried on in order to supply the London markets with ducklings, and it is the Aylesbury breed that is exclusively used for this purpose. At one time the rearing and fattening of ducklings was confined in England to the Vale of Aylesbury and the surrounding districts, but recently the practice has spread to other parts; but it is interesting to note that wherever the industry flourishes, it is either the Aylesbury breed or its crosses that is generally used. The Aylesbury is one of the most valuable breeds

of ducks, and for the production of ducklings early in the year, when prices rule high, it has no equal. The ducklings grow quickly and mature early, and at the age of from eight to ten weeks they are ready for the table, and weighing from 4 to 5 lb. In the early months of the year ten shillings a couple is a very common price to pay for them. They are light in bone, and therefore the proportion of offal is comparatively small. The flesh is of excellent flavour and is light in colour. The ducks are fairly good layers. The colour of the eggs is usually white, but it may vary from white to a deep green. Stock birds average in weight from 7 to 9 lb. in case of the drakes and from 6 to 8 lb. in case of the ducks. These weights apply to the birds when in a store condition, but fully matured and ready for breeding. Exhibition specimens often weigh 20 lb. and over per pair, but these weights have been obtained by means of a forcing diet, and the birds are in consequence often spoiled for breeding purposes. The Aylesbury has pure-white plumage, legs of a deep-orange colour, and a pale flesh-coloured bill. It is heavy in the body and short on the leg. In shape it resembles a boat supported a little behind the centre. Within recent years it has been so bred that the lower part of the body has become deeply keeled. This has been done in order to give the bird a more massive appearance. Up to a certain extent the change was undoubtedly an improvement, but many breeders have overstepped the mark, and the present exaggerated keel is much disliked by market dealers.

Campbell

This is a comparatively new breed, and was produced by Mrs. Campbell of Uley, in Gloucestershire. It is a good layer, matures quickly, and makes a fair table bird. It is small in size, the average weight being from 4 to 5 lb. The flavour of its flesh is like that of a wild duck, and it is said that the wild duck has been used in the formation of the breed, which it closely resembles. A variety of this breed is known as Khaki Campbell. Probably the Indian Runner has been used to produce this variety, for it is a good layer and a splendid forager. Both sexes are khaki-coloured except the head and stern of the drake, which are bronze-green.

Cayuga

This breed takes its name from the lake Cayuga in America. It was introduced into this country about 1871. At that time the Cayuga duck was small in size and rather dingy in colour. To improve the brilliancy of the feathers and to make the breed more attractive-looking, English breeders crossed it with the East Indian duck, which is noted for its rich green, glossy plumage.

The crossing had the desired effect, but it reduced the size of the duck, which was already on the small side to be of much market value. It is said to have been further crossed with the larger breeds to improve the size, and although its utility value was greatly improved, still, at present it is only kept for exhibition purposes. It is a hardy breed, matures comparatively early, and is a very good layer. The ducklings are easy to rear, but do not grow nearly as quickly as those of the Aylesbury, and on that account they are not largely reared to supply the duckling trade. In shape and size the breed is similar to the Aylesbury, but the legs are larger, and thus the body is carried much higher off the ground. It possesses a long, broad, deep frame, and carries a large amount of meat on the breast which is of superior flavour and texture. The plumage is of a deep-black colour with a bright-green sheen surmounting it, but the wings show greater brilliancy than the body feathers. The legs are large and strong in bone, and are of a dull-orange colour. The drakes average about 7 lb. and the ducks about 6 lb. in weight.

Indian Runner

The story of the origin of this breed is rather interesting. It appears that about the middle of the last century an English sea captain when on a visit to India noticed a breed of ducks very active in its habits. On making enquiries he found that the ducks were excellent layers, and could be depended upon if allowed free range to pick up practically their whole living. He procured some of these birds and took them home, and presented them to a friend of his living in Whitehaven. Some years afterwards he procured some more from the same place, and brought them back to England, and it is from these two stocks that the Indian Runners of this country have descended. For some time the breeding of these ducks was confined to the counties of Westmorland and Cumber-

land, and it is highly probable that they were freely crossed with the common duck of these counties. The breed attained a considerable local reputation, and in 1890 it became known to the outside world, and since that date it has steadily increased in popularity. It is for its wonderful laying powers that the Indian Runner has become so popular, and it is quite common to find specimens of the breed laying as many as 150 eggs per annum. It is true that the eggs are small in size, being not much larger than those of hens' eggs, but they always command a ready sale. The birds mature early; ducks hatched in May will commence laying in October, and will continue to lay throughout the winter months. Moreover, the ducks cost very little to keep, for being excellent foragers they find most of their own food, and on this account they are excellent ducks for farmers.

They will not stand confinement, but will thrive where there is not a pond, as they are not particularly fond of swimming. The Indian Runner is small in size, but the flesh is of excellent flavour, and when the ducks are killed young the meat is deliciously tender and juicy. Although the ducks only command small prices in the markets they are great favourites for home consumption. They weigh on an average from $3\frac{1}{2}$ to $4\frac{1}{2}$ lb.

The Indian Runner has a peculiar appearance, its body is long and slender with the legs placed well back, the head and neck are very fine, and the bill is long. When searching for food the ducks run along the ground very rapidly with their head and neck outstretched. It is from this characteristic gait that the breed takes its name. There are two varieties, the Fawn, and the Brown and Grey. The Fawn is the most popular, and no doubt it is the original breed, the Grey having in all probability been produced by crossing with the local stock. In both varieties the legs are of an orange-red colour, the head, neck, and wing flights are marked white, the rest of the body being either fawn or brown and grey.

Muscovy

The Muscovy duck belongs to South America and has been known for more than three centuries. This breed cannot be considered a profitable one to keep and has never become popular. It possesses a vicious temper, and cannot be kept in contact with other fowls. Its flesh is very rich in flavour, and at one time it was very popular in America, where it was considered very valuable for crossing purposes. It is an indifferent layer, but the eggs are large

in size and of a white colour. The Muscovy drake grows to a great size, and often weighs as much as 12 lb., but the duck seldom weighs more than from 6 to 7 lb.

The colour is usually pied black-and-white, the sides of the head are naked, whilst surrounding the eyes and spreading down to the beak are scarlet fleshy protuberances, which are very well developed in the drake and give it that wicked sinister expression so peculiar to the bird.

Orpington

The Orpington is one of the newest breeds of ducks, and was produced by the late Mr. W. Cook, of Orpington. Great utility properties are claimed for this breed, but it is as a layer that it is best known. In appearance it somewhat resembles the Indian Runner, but it is slightly larger in the body.

There are two varieties, the Buff and the Blue, but at present it is difficult to breed them true to colour.

Pekin

The Pekin was introduced into this country from China about 1873. It is not considered such a good bird for table purposes as either the Aylesbury or the Rouen, but it is the most prolific layer of our heavier breeds. It possesses a larger frame than the Aylesbury, but the frame does not carry as much flesh. It is a valuable breed for crossing purposes, and an Aylesbury-Pekin cross is reared extensively for the early duckling trade, as the cross grows quite as rapidly and attains a greater weight than the pure Aylesbury. In America, on the great duck farms, where thousands of ducks are reared annually, the Pekin is the only breed kept, and there it has a very high reputation, both as a layer and a table bird. In this country the Pekin is also gaining in popularity as a table duck, especially since the breeding of Keeled Aylesbury became the fashion, as the absence of a keel is considered a good point in a table bird. The Pekin is very hardy and an excellent forager.

The Pekin possesses white plumage with a tinge of canary yellow running through it. It differs from the Aylesbury in the shape and carriage of its body. An Aylesbury is more or less boat-shaped, with a slow unwieldy gait; a Pekin has its legs placed well back, which gives the bird an upright or a penguin appearance. The legs and bill are of a deep-orange colour, and the bill is shorter

and broader than that of the Aylesbury. It is quite common to find Aylesbury with orange-coloured bills, but this is an indication of Pekin blood. At one time these two breeds were largely crossed, and the infusion of new blood has been very beneficial to the Aylesbury as it was losing vigour through being inbred.

Rouen

This breed is supposed to have derived its name from the city of Rouen, in France, for there is still a breed of ducks which closely resembles it bred largely in Normandy. It has also been suggested that the name is a corruption of Roan or Rowan, as in some parts of this country the breed is known under that name. The Rouen is the largest of all the domesticated breeds of ducks. It is, however, slow in maturing, and on that account is unsuitable for the duckling trade. During the autumn months, or at Christmas, when large ducks are in demand, it answers the purpose even better than the Aylesbury. Fully-matured Rouens carry an abundance of flesh, but it is slightly dark in colour. It is, however, very fine in flavour; in fact, it is considered richer than the meat of any other domesticated breed of ducks. The Rouen is a good layer of large pale green-coloured eggs, but it does not commence to lay very early in the season. The drakes weigh on an average about 10 lb. and the ducks about 9 lb. In general appearance the Rouen is comparatively short, but very deep in the body. The plumage closely resembles that of the Mallard or the wild duck. The ground colour of the duck is brown, but it is decorated with a pencilling of darker brown or black glossed with green. A white ribbon mark is also found on the wings. The drake, when in full feather, is a very beautiful bird, and possesses great richness of colouring. The head is of a beautiful green colour glossed with purple, which extends down the neck to a collar of pure white. The breast is of a rich deep claret colour, and the under part is of a delicate French grey. The back is a rich greenish-black, and the wings a greyish-brown, with "ribbon marks" of bright blue edged with black on both sides across them, as well as white bands. During summer the drake changes into the homely garb of the duck.

GEESE

Embden

Embden or White geese have existed in Europe for thousands of years. In the early ages the White goose was more highly esteemed than the Grey. The Romans regarded this bird as sacred, and always selected it for breeding purposes in preference to geese of any other colour. This may have been due to the geese which are said to have once saved the city of Rome having been white ones. The breed has derived its name from Embden town, in Germany, in the neighbourhood of which White geese have been bred from time immemorial. Embden geese appear to have been imported into England about the beginning of the nineteenth century. White geese existed in Britain long before that date, but these were smaller in size than the German breed. The modern Embden breed of this country is supposed to have been produced by first crossing the German and the native White goose and then by selection. The English Embden of to-day is a handsomer and a larger bird than either of its original parents. The plumage is of a beautiful white, and the bill and legs are orange colour. White feathers are more valuable than coloured ones, for they usually realize from 2*d.* to 3*d.* per pound more in the market. Embden geese grow quickly and mature early, and on this account they are specially suitable for the "green-geese trade" in the autumn. They are also splendid foragers, and can be depended upon to pick up the whole of their food if allowed full liberty. The geese make good sitters and mothers, but they are not very prolific layers, averaging from 20 to 24 eggs in a season. Mature and well-fattened ganders weigh from 25 to 30 lb., and geese from 18 to 22 lb. each.

Canadian

This breed belongs to Canada and the United States of America. It is believed to have originated from a cross between the ordinary Wild American goose and the domesticated varieties. It is small in size, very hardy, grows quickly, and carries an abundance of flesh. For a goose the meat is particularly delicate in flavour, and is considered the very best of all our domesticated varieties. Were it not for the wild habits of this breed, it would no doubt be very valuable for crossing with the geese of this



Photo Sport and General

BUFF ORPINGTON COCK



Photo Sport and General

BUFF ORPINGTON PULLET



Photo. Sport and General

WHITE ORPINGTON COCK



Photo. Sport and General

WHITE ORPINGTON PULLET

country in order to improve the quality of their flesh, especially since the palate of the English people seeks geese more delicate in flavour than the rich gross birds of former days.

Chinese or Knobbed

This breed differs from our domesticated varieties in possessing a knob or protuberance—something similar to that of a swan—at the base of the upper bill. It is also smaller in size and longer in the neck. The Chinese goose is a very prolific layer, laying from 20 to 25 eggs in a sitting and several sittings during the year. The flesh is not so soft as that of our domesticated varieties, but it is of a very good quality. The breed is hardy, active, and very useful where moderate-sized geese are reared. It is also very suitable for crossing with the soft-fleshed breeds. It is well known that geese are very slow to mate with strange partners. A point claimed in favour of the Chinese gander is that it is an ardent breeder, and will mate almost immediately with a strange goose. A cross between the Chinese and the Embden produces a goose which grows quickly and fattens early, and as the demand at present is for a medium-sized goose, the cross makes a valuable table bird. There are two varieties of this breed, viz. White and Brown.

Toulouse or Grey

This breed derives its name from the well-known city of Toulouse, in the south of France. In the neighbourhood of this city the breed is bred extensively, but the birds are smaller in size than the Grey geese bred in this country. The Toulouse grows to a larger size than the Embden, but it is very slow in maturing. It fattens well by Christmas, and makes a very large meaty bird. It is not so popular with buyers as formerly, for the palate of the population has changed, and a smaller bird with finer-quality flesh is now preferred. The Toulouse is a very good layer, but is not a reliable sitter. On this account the eggs are better hatched by hens.

The plumage is grey in colour, being very dark on the head, neck, back, and wings, lighter on the breast, and gradually becoming more so towards the belly, where it ends in white. The bill, legs, and feet are orange in colour.

TURKEYS

American Bronze

This is the largest of our breeds of turkeys. It was first imported into England about the beginning of the nineteenth century. At that time it did not become popular in this country, due possibly to its large size, and also to the fact that it had not been properly domesticated. About 1870 the only breeds largely bred in England were the Cambridge and the Black Norfolk. These were of average size, the biggest of them weighing from 25 to 30 lb. each, and they were beginning to show signs of being inbred. About this time there was also a demand for a larger-sized bird, and the American Bronze was again imported into this country. This time it immediately became popular, and is now more largely bred than any other breed of turkeys. It is a very valuable breed for crossing purposes, and it has done much to improve the vigour and stamina of our native breeds. The American Bronze grows to a large size, and when fully matured it carries an abundance of flesh, fattened gobblers often weighing from 45 to 50 lb. The flesh, however, is not so soft nor so fine in quality as that of the other breeds. It is very vigorous, quick in growth, and is considered easier to rear than either the Cambridge or the Black Norfolk. The American Bronze possesses a long, deep body, with a broad, full breast, and large, powerful wings. The head is large and strong, with neck and legs of fair length. The plumage on the neck, back, and breast is of a rich lustrous bronze, which glistens in the sunlight like burnished gold. The feathers on the sides have a narrow band of black at the end, and the wings when spread out show alternate bands of bronze and grey, whilst the wing-bows are black with a greenish lustre. The tail is black, irregularly pencilled with light brown, ending in a broad black band with a wide edging of grey.

Cambridge Bronze

This breed has been evolved from a cross between the Old Grey turkey of Cambridgeshire and the American Bronze, but some authorities state that the Old Grey was first crossed with a Copper or Brown variety and then with the American Bronze. The Old Grey variety was famous for its hardiness, fine quality of its flesh, and the abundance of breast meat it produced, but it was

rather small in size. The Cambridge Bronze turkey has inherited size and vigour from the American Bronze and fine quality of flesh from the Old Grey, with the result that as a table bird it is very hard to beat. It is light in the bone, and carries an abundance of flesh which equals that of the Black Norfolk in flavour. It does not attain the size of the American Bronze, but it carries more meat in proportion to its size than that breed. At present there is a growing demand for a medium-sized turkey, and on this account it is fast becoming popular in the market. In general appearance this breed more or less resembles the American Bronze, but it has a shorter body as well as shorter legs.

Norfolk Black

This is a very old breed of turkey found chiefly in Norfolk and the adjoining counties. It is smaller in size than Cambridge Bronze, the gobblers only weighing about 20 lb. and the hens about 12 lb. each. It is famous for its abundance of white flesh, which is deliciously soft, juicy, and very fine in flavour. This breed, however, is more delicate and more difficult to rear than our other breeds of turkeys, due possibly to its having been too much inbred. On this account it is fast becoming extinct, and its place is being taken by the American and Cambridge Bronze. It is entirely black in plumage, and is a very handsome breed. If means had been taken earlier to introduce fresh blood into the breed it would probably have retained the proud position which it once held—namely, “England’s Christmas Turkey”.

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Photo. Sport and General

RHODE ISLE RED COCK



Photo. Sport and General

RHODE ISLE RED PULLET



Photo. Sport and General

SILVER WYANDOTTE COCKEREL

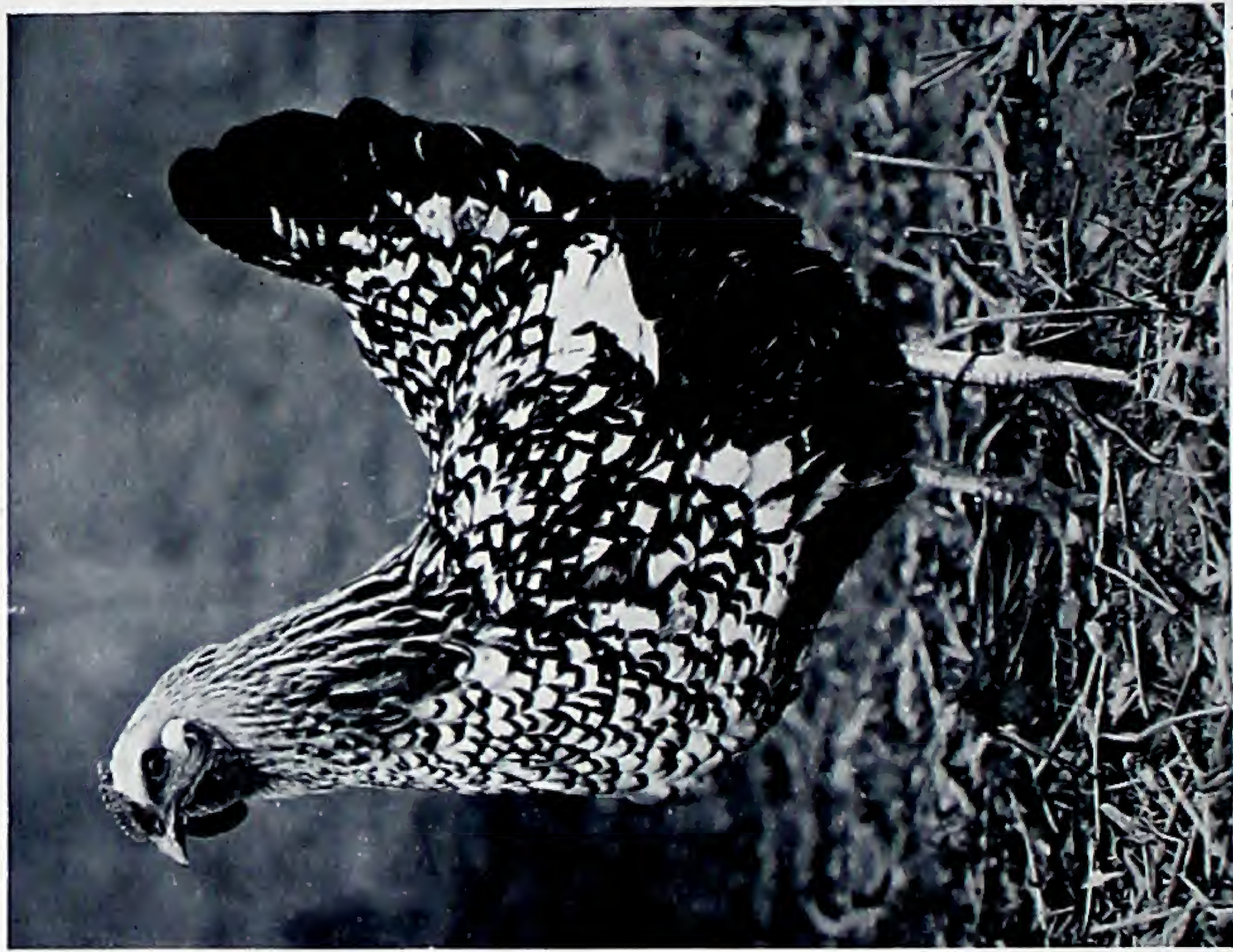


Photo. Sport and General

SILVER WYANDOTTE PULLET

CHAPTER VI

THE MANAGEMENT AND FEEDING OF POULTRY

By G. A. PALMER

THE REARING OF CHICKENS

All branches of poultry keeping have received more attention during the last ten years than ever before. Then it was chiefly confined to cottagers and smallholders; now it is considered a serious department upon many large farms. As with all farm stock the rearing is of paramount importance, for the profit-bearing capacity of beast or bird is largely decided in the first few months of its existence. Any serious check in the early stages can never be fully made up. Therefore with chickens, every detail of feeding and management must be carried out with the most scrupulous care. This subject divides itself into two branches, rearing by natural and by artificial means. On a large poultry farm it is better to use both methods, each of which has its merits. As yet most are hatched by hens, but the use of incubators and foster-mothers is rapidly spreading. The success of any rearing is largely due to the management of the parent birds, which will be dealt with in another section. But it may be said here that it is essential, not only that the eggs shall be fertile, but that the germs shall be of sufficient strength to be able to hatch out. As the embryo is entirely dependent upon the amount of nutrition in the egg, it follows that the contents must be of the highest quality, and this can only be ensured by perfectly balanced foods in the breeding pens.

COLLECTING EGGS

This should be frequently done in cold weather, as the vitality is much reduced by a temperature several degrees higher than freezing-point. Also, when there are broody hens in the pen the eggs should be taken out four times daily. They should be care-

fully placed in a basket lined with hay and carried with as little shaking as possible. The presence of dummy pot eggs is not essential, and many an egg is cracked by the contact.

CHOICE OF EGGS FOR SETTING

When hens are not in good breeding condition, chiefly on account of the reproductive organs being loaded with fat, consequent upon wrong feeding, the eggs are much more misshapen. In a yard where all are fed alike, it is the worst layers that get unduly fat and are apt to produce misshapen eggs. Therefore care in the choice of eggs means that we are breeding from the most prolific as well as the healthiest birds. Extremely large eggs should be avoided, not merely because they might be double-yolked, but because very prolific hens rarely lay the very largest, and because eggs of more than normal size, for the breed we are using, have a greater proportion of infertiles, and, of those which hatch, bring out the weakest chickens. Small eggs of one and a half ounces will hatch strong chicks and may be used when all the produce is destined for the table. But when hatching for laying stock it is better to set eggs of two ounces or a little over, as the pullets will most probably lay eggs similar to those from which they were hatched. The old superstition, that the sex can be foretold by the shape of the egg, dies hard; but of course there is nothing in it. The laws that influence sex are as yet little understood. An old cock mated to pullets usually gives more than half females, and a strong cockerel mated to hens gives a preponderance of males. The same breeding pen, undisturbed, usually gives a greater proportion of females in late spring than earlier in the season. The eggs chosen should be of the pointed oval shape, smooth in shell, and free from any blotches or irregularities, such as rings round the narrow end. The shells should be shiny and hard; those with a soft, chalky appearance never hatch well.

CARE OF EGGS FOR SETTING

They should be kept in an even temperature, from 50° to 60° F., and out of any direct draught, such as between door and window or chimney. They should not be placed so that sunlight can fall upon them, in fact everything possible should be done to retard the evaporation of the watery parts through the pores of the shell. A very dry cellar is an excellent place to keep them in. The eggs should be laid on their side in boxes on any soft porous material,

free from taint. Cork chips are the best, being elastic, free from smell, and admitting free passage of air to the shell. Bran is next best. Sawdust should not be used, because of the smell of turpentine, which quickly permeates the egg. The eggs should have their position changed daily. They need not be turned exactly over, but simply be rolled a little by the fingers, so that the contents may change position and so prevent any portion becoming fixed. Eggs thus cared for will be quite fit for incubators at a week old, and for hens up to a fortnight.

CHOICE OF BROODY HENS

Almost any cross-bred hens will sit, and occasionally one of the non-sitters will go broody and make a good mother. First crosses between two non-sitting breeds, such as the Houdan-Leghorn, revert to ancestral habits and sit freely. The best sitter in the pure breeds is the White Orpington. Next, Buff Orpingtons, the Rocks, the Wyandottes, and the Sussex. The heaviest breeds, Langshans, Brahmas, Cochins, are clumsy on the nest and break eggs. The Dorkings sit well when broody, and so do all the Games. The latter will protect chickens against crows and even hawks. The White Orpington has all the qualities that go to make an ideal sitter—size, gentle disposition, early broodiness, plenty of fluff so as to be a good winter nurse. It is also so quiet on the nest that it rarely breaks an egg. For Pheasant and Bantam eggs the Silky is considered best. The writer has been keeping poultry for thirty years, and has bred over sixty varieties, including all those named.

THE SITTING-HOUSE

If it were not for foxes, hens might set themselves in the hedge-rows, and would bring off every possible chicken in most cases. But hens rarely make nests in the open until spring has well advanced, and they should never be allowed to sit in the poultry-house with the others, as they are sure to be disturbed and laid to. It is better in every way to have them under control. Any out-building can be used as a sitting-house, and a spare field poultry-house will serve. So long as the house is light enough for the attendant, and has room enough for him to move about, nothing more is wanted. Brick, wood, or earth floor will do, and the writer has hatched thousands in lofts. The most important part is the preparation of the nest, and it depends upon this, more than upon

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the size of the hen, how many eggs may be given. Orpingtons should cover from sixteen to twenty eggs, and one large poultry farmer gives up to thirty. This, however, is an extreme number, and could only answer in most experienced hands. Almost any box will do. Orange cases usually have three partitions, of which the two end ones are large enough. When these are used they should be laid on their sides, with one band of the top left on to keep in the nests. These are about 15 in. square. One advantage of this kind is that the hens can walk on and off when the shutters attached are lowered. With other boxes open at the top the hen must be lifted on and off. When hens are set in a field poultry-house this does not matter, as the best way is to tether them by a string to a peg in the ground whilst they are fed. But for early setting a more roomy house is to be preferred in the farm buildings, where hens and attendant can be out of the cold and rain. To make the nest, some loamy soil, such as can be found in a garden, should be laid in the bottom of the box to the depth of 3 in. This should be patted solid, and so shaped that the nest is slightly concave, the corners well filled up, and a little raised soil round the sides. When this is solid, a little well-broken, soft hay should be spread over and patted into shape. Two or three trial eggs should then be placed in the nest. To ensure hens taking to the new nests, they should not be moved from where they happen to start sitting until they are so broody that they will bear handling. Another important point is to move them after dark. When shut in by a board or bag they feel the eggs, and usually settle at once, and by morning have quite taken to the nest. During the night the hen shapes the nest to her body and makes all quite solid. Then the nest is fit to receive the setting. The nest should have been arranged to hold fourteen to twenty, according to the size of the hen, but it is of more importance that the eggs should fit the nest than the hen. The nest should be filled just so full that there is room left for the hen's feet, and then none will be broken. The sitting hen should be dressed with powdered pyrethrum, well dredged to the skin. This can be repeated ten days later, and again after hatching. The chickens also should be dredged all over, and have the powder rubbed well into the fluff before being put out. Hens rarely desert the eggs if freed from body vermin. On the first morning the shutters should be removed, corn thrown down, and the hens called with the usual feeding call. Most will walk off; any that do not can be carefully lifted off. If all have taken to the nests, as is probable, the trial eggs can be removed and the settings given. The eggs are best placed in circles,

pointed end to the centre, and with the rounded end of the egg slightly higher than the pointed end. Travelled eggs should always be rested twenty-four hours before being set; and even then they do not hatch so well as those produced at home. For this reason alone it is advisable to keep one's own breeding pens. The shutters are placed up until the hens should go back, when they may be removed one at a time and the hen driven on. When all are on, the house may be left, but it is advisable to look along the nests to see that all have settled properly. If they have not, any eggs lying outside the hens should be pushed underneath them. This is the ordinary routine at about the same hour every morning. The food may be equal parts oats, wheat, maize, during the sitting; flint-grit, water, and a little meat, but little green food. The period of cooling depends much upon the weather, but may be five to fifteen minutes in the first week, ten to twenty in the second, fifteen to forty in the third, the latter, of course, only in hot weather. On the seventh day the eggs may be tested for infertiles. If a sheet of cardboard has a hole cut in the centre of the same shape as an egg but not quite so large, and the egg is pressed firmly into the hole, and so held that the operator looks through the egg at a bright light, the infertiles can be seen at a glance, as they are clear and colourless all through. It is better for the novice to remove no others, as only experience will show which cloudy ones contain live chickens. Briefly, the live germ is a dark spot floating near the centre of the egg, with the dark body and the surrounding blood-vessels showing, so that it somewhat resembles a spider. The clear eggs removed, the others may be closed up, so that a hen may often be reset. If the weather is dry, a little warm water may be placed in the soil, just sufficient to percolate and slightly moisten the whole. Too much moisture is as bad as too little, and the eggs are better not sprinkled. Soil is the best medium upon which a nest can be made. Eggs will hatch well, usually, in a wooden box with only hay or straw, but never in an iron manger. This shows that the heat-conducting capacity of the material used must be considered. When soft southerly and westerly winds prevail, eggs hatch much better than during north-east winds. Under the latter conditions hen eggs have been twenty-five days, and duck eggs thirty-five, in the writer's own experience. If at any time an egg should be broken in the nest, the rest of the eggs should be washed clean in a bowl of warm water at 105° , the hay removed, replaced by clean, and, if necessary, the hen's feet and breast washed. A dozen hens is as many as can be let off and fed at once. They rarely quarrel after the first day, and soon get accustomed to the

daily treatment. Some breeders prefer carrying all the hens outside and tethering them to pegs, but it takes far more time, and is in no way better. It is quite possible to feed and attend to seventy hens in one hour, but only where there are several houses and the work is done very methodically. On the eighteenth day all the eggs should be dipped in a bowl of water at 105° , and allowed to remain for sixty to a hundred seconds. Those which float upright and with a little of the wide end out of the water usually contain live chicks, and may be seen to jerk in the water. Infertile eggs that have not been removed float in much the same way, but of course do not stir. Eggs that sink to the bottom may be dead chickens, and eggs that have been retarded by being chilled. Neither need be taken out, as they are not dangerous, and some may hatch even if a day late. The dangerous eggs are those which float very high in the water and lean much to one side. They are those which are familiarly termed "rotten", and in which the life-germ died early, and chemical changes have resulted in the formation of sulphuretted hydrogen. If one of these bursts in the nest it is fatal to the live chicks in the other eggs. For the shell is porous, and in the last stages the pulsating membrane, which has served as the breathing apparatus, has ruptured, and the chicken is using its lungs in the shell.

TO HELP OUT A DRY CHICK

When the chicken is ready for hatching it commences chipping the egg with the point of its beak, and meantime struggles in such a manner that it is propelled by its feet. So it keeps on tapping and turning in the shell until it has nearly completed the circle, when the cap at the wide end of the egg falls off. A few more struggles, and the head comes from under the wing, and it is then quickly out. The membrane, if tough, presents more difficulty than the shell. If the chick is too dry the fluff may be dried to the membrane, and it cannot do the necessary turning. This is shown by a hole being bored at one spot, with no sign of the jagged line advancing round the shell. The remedy is to enlarge the hole, dip the egg in a bowl of water at 105° , and allow a few teaspoonfuls to trickle into the egg.

After turning about in all directions to moisten everything, the water is poured out, and the egg placed again under the hen. It is best during hatching to lift the hen every four hours, remove any strong chicks to a warm flannel-lined basket to be kept near the fire, tidy up the nest, and remove all broken shells. Then the

hen may be placed on the empty nest, and whilst one hand holds her down, the other can be putting the damp chicks and chipped eggs underneath her. When one has an incubator it is well to put all chipping eggs into it to finish, leaving one only for the hen to hatch, so that she will take to the brood. This saves any deaths by trampling.

PUTTING OUT THE CHICKS

In winter the best place to start is in an open-fronted shed on earth floor, such as a cart-hovel. Or cheap sheds may be made of poles and gorse, thatched with straw, and kept for the purpose. The floor should be covered with several inches of dry sand. Where much rearing is done, sand should be stored in the dry during summer.

The coops can be placed in the sheds, and the chickens allowed only the run of the shed. After a week they will stand all ordinary winter weather if in a sufficiently sheltered spot. A shrubbery with dry leaf-mould makes an ideal place. The cut corners of a haystack, under a Dutch barn, come in useful where there are no rats. In a bleak situation they can be kept in the sheds for several weeks, and when put out be screened by hurdles packed with straw.

By March they may go at once on to short turf. Where several pure breeds are kept it is better to mix the chickens, so that each hen has several colours. She is not so likely then to kill a chicken which strays from another coop. There is no better place for the first few days than a sheltered lawn kept short by a mowing machine, or a sunny ash path will do. On land that is subject to gapeworm the chicks should be kept on bare soil until six weeks old, when they will be strong enough to resist the attack. At no time should chicks under two months old be allowed to run in long, wet grass, or the mortality will be great.

Coops of various patterns may be used, the old hutch with barred front being as good as most. Many are too small for comfort, and they should not be less than 2 ft. by 1½ ft. Ham boxes make cheap and serviceable coops, turned upside down, with a slide hole made for the hen, and a few holes for ventilation along the top. No coop is complete without a covered run to attach to it. The best one is 6 ft. 6 in. long, 2 ft. 6 in. wide, 2 ft. high at front, with roof sloping to 1 ft. 6 in. at back. The two ends and the back are completely boarded. The front is divided by uprights into three spaces. The two end ones are covered by inch-mesh wire netting, of which one has a shutter to fit, which may be kept in place by buttons.

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The centre one serves as a door, and the space is filled by a wire-netted frame, which also fastens up by buttons. In the centre of one end a slide-hole is made. There is no handier appliance on a poultry farm. It can be set facing south, and the end attached to a coop or foster-mother. In bad weather the chicks are in the dry, and yet catch any gleam of sunshine. In storm it can be set back to the wind. For turkey rearing it is indispensable.

After the rearing season is over it will serve as a cockerel coop or a dusting-bath for hens. It should be made of $\frac{1}{2}$ -in. red deal tongued-and-grooved boarding, and built on strong 2-in.-by-1 $\frac{1}{2}$ -in. red frame. The cost is about 7s. for material, and 3s. for labour. With a sufficient supply of these chicken rearing becomes easy at any time of the year.

It cannot be too much emphasized that winter chicks will not do on board or brick floors, and that if these are used a good coating of dry soil must be spread over them. For very wet weather, when the land is saturated, it is well to keep the outdoor chicks off the ground. A loose-boarded bottom may be made to fit any of the coops. A square ledge is nailed on to it, into which the coop can be set, and the floor can be taken away as soon as the earth is dry enough. This wooden floor should be nailed on to two strips, which take the bearing, so that the whole of the board does not touch the ground. Then, when it is covered with dried sand or fine earth, the chicks will do well. Boards used alone always give chicks the cramp in the legs.

Fowls never do quite as well as upon clean land, where none have been running for some years. Still, with good management, fowls will run thickly, as will be shown later. But it is imperative that chickens should have perfectly sweet land, and this is where many fail. The same old spot in the orchard is used year after year, until it is sodden with poultry dung. The writer uses an eight-acre field as the rearing ground, from which the chickens are drafted as soon as they are old enough to go farther afield. This is kept free from poultry from July to March, and is almost as clean to commence each season as if none had been on. This condition is greatly helped by dressings of basic slag. The phosphates unite with the nitrogen of the chicken manure, and cause a great growth of grass and clover, which is eaten off by cattle and sheep. The 50 per cent of lime in the slag also acts as a sweetener. When chickens are placed out directly on to the grass it is as well to run the lawn mower over the patch for the first days on which the coop is set. A little short chaff can be spread in one corner, and the chickens placed on it. The hen (having been previously

well fed with maize) is put down and allowed to walk to the chicks. She must be watched, and if she once gets the chicks underneath her, may be left with safety. But an occasional hen will hatch a brood and then will not take to them, and this must be looked for. The number to be given to a hen depends upon the time of the year. Eight to ten is enough in midwinter, as they will need brooding after they have attained some size; but in spring twelve to eighteen may be given. It will, however, be found that the lots of twelve will do better than more, after they begin to forage. The best number, no doubt, is that which a hen is likely to hatch herself, and this rarely exceeds fourteen. It is better for the hen to go into the run with the chickens. This means that she is fed as they are, but she quickly repays it by starting to lay again. Many hens will lay an egg daily, and continue to brood the chicks as long as is required.

The coop and run must be moved on to a clean spot daily, and this has much to do with the wellbeing of the chicks. After a fortnight the run may be taken to another coop, and the brood given perfect liberty. When about six weeks old the broods may be drafted to a field-house. As the hens have been running together they will not quarrel. In the evening three to four hatches, about fifty chicks, may be caught up and carted to a field-house of about 30 sq. ft. floor room. Each brood is put into a corner, and the hen turned down to them. When settled, a second lot is placed down, and so on. After this the labour of feeding is very little. An automatic feeder should be placed in each house for them to help themselves at grain. The soft food is given when they are let out in the morning, and only a second visit is required to shut up at dusk. These field-houses will be described later. The floor must be covered with some loose material, such as powdered peat-moss and sawdust. After the chickens know the runs, the hens may be removed. In early spring they may stay until they are tired of them, but a hen should always be taken away if she starts pecking at them. In hot weather they may be taken away earlier. If removed too soon the chicks are apt to crowd together, and some may be crushed. As soon as the cockerels can be distinguished they can be picked out and taken to a distant house to grow into stock birds or fattened; and the pullets, to the number of about twenty-five, to the above-mentioned house, may stay for their laying life.

After the pullets are four months old the perches may be used, but cockerels should squat on soft floors still longer, or the breasts may become crooked. All the writer's cockerels are sold for breed-

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ing, and none are allowed to perch under six months old. Chickens reared with hens always repay a dressing with insect powder. Spraying with a coal-tar disinfectant once a month will keep the houses clean. The floor deposit must be stirred up frequently, and must not be allowed to get foul. It is best to set the field-houses not more than 30 yd. from a hedge, to which the chicks can go for shade. This is absolutely essential in hot weather. Some think that they damage the hedges, but this is not so, as owing to the manure dropped a much more vigorous growth of thorn is obtained after the first year.

REARING BY ARTIFICIAL MEANS

Artificial incubation—probably the most fascinating feature of poultry farming—is, quite contrary to popular ideas, not at all new. For two thousand years it has been successfully practised by the Egyptians and the Chinese.

They employed, and still employ, huge ovens covering perhaps 6000 sq. ft., strongly built of sun-dried bricks. There is a passage up the centre of these opening out on either hand to circular vaults, in which the incubating is carried on. The fuel is placed in the egg-chamber, and the smoke and surplus heat escape through an aperture at the top.

Their methods are certainly crude (they know nothing of thermometers), but they have been doing for centuries what we have only just commenced to do—hatching chickens with unfailing consistency.

Dr. Bonnemain's incubator, which he made in 1777, was the first European effort of any note. He was followed in 1845 by Vallée, who introduced an automatic governing valve.

About the year 1865 the science seemed to receive an impetus, for machines more or less workable were made by Carbonnier, Schröder, Colonel Wortley, Penman, Boyle, and others.

At the same time this development also continued in America, their machines being much like the English in that they were of the "tank" variety. Renwick's machine was very peculiar; instead of keeping an even temperature, he used a clockwork device to make it vary within certain limits.

Christy's hydro-incubator was the first English machine to have any sale, but it involved too much trouble in the working.

The most noticeable point of these early incubators was their lack of packing; most of them, in fact, having no non-conducting material in their sides whatever. Still, these early types were suc-

cessful in keeping investigation on the right lines, and it was in 1881 that Hearson brought out the tank incubator as we know it to-day; for, since the expiration of his patents, it has been copied by most English manufacturers.

The secret of his success was the now well-known thermostatic capsule, which actuated his lamp valve. This capsule consists of two sheets of metal soldered round the edges, and containing a little sulphuric ether diluted with alcohol. This mixture (which boils at anything above 94° , according to the amount of alcohol added) at a certain temperature expands the capsule, which, by the aid of an upright rod and a long lever, lifts a damper from above the lamp chimney and allows the surplus heat to escape. A sliding weight on the long lever and a head-screw above the upright rod provide means of adjustment.

A paraffin lamp or gas burner is employed, and if a diminution of heat in the egg-drawer cause the capsule to contract and so close down the damper, the heat passes through a flue which extends round a copper water tank some 8 in. above the eggs.

The outer casing of the machine is constructed in yellow pine, the walls being double, and the space between them packed with a non-conducting material.

The egg-drawer is made slightly deeper in the middle, thus allowing the central eggs, which would otherwise be at a higher temperature than those at the outside, to be at a greater distance from the heat-radiating tank.

The machine has a double bottom, the outer one having four ventilators about $\frac{3}{4}$ in. in diameter, and the inner having one large hole in the centre. A current of air is continually passing through these into the egg-chamber, and escaping through more holes immediately beneath the tank. On account of the drying nature of the rapidly-moving air a tray of cold water is kept beneath the eggs.

This describes the whole machine, except that there is a drying-box on the top. It is also a passable description of most other tank machines. Phipps's and Tamlin's are on this principle, with only slight modifications. Toope's machine is much the same, but has a case of asbestos; and on account of the non-conducting nature of this, it runs very economically as regards oil.

The hot-air incubator has not, up to the present, been as popular here as in America, and, indeed, owes most of its development to the enterprising inventors of that country. These machines do not adhere to a fixed standard, as is the case with the tank variety; some carry the lamp fumes directly through the egg-

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chamber; some exclude these, and employ only pure air for ventilation; others need added moisture, as with tank machines; and some even dispense with this entirely.

The last-mentioned are the most up-to-date, and are really good hatchers. The first of this pattern was brought out by that clever incubation expert, Mr. C. A. Cyphers. His incubator is partly built of a porous material, through which an interchange of gases is possible. The air in the egg-chamber is thus constantly being replaced by fresh from the outside. This method of ventilation causes practically no draught, and as there is no rapidly-moving air to carry the moisture away from the eggs, hatching is done without the aid of water-trays.

A thermostatic bar regulator is usually employed. The ether capsule—quite efficient under the steadying influence of a tank of water—is capable of a variation of two or three degrees, according to the atmospheric pressure (as is explained later), and is therefore hardly accurate enough for this type of machine, in which the temperature can rise or fall quickly. The thermostatic bar, in its simplest form, embodies two bars of metal, one of which expands more under the action of heat than the other. As the two are riveted together, if heat be applied the more expanding one is compelled to buckle. This is the force which is utilized to lift the lamp valve.

Which of these types of incubator is the better for the ordinary user it is difficult to say. It depends to some extent upon the situation in which it is to be worked. A very dry position favours a tank machine, as moisture in these can be given copiously, while in a damp place a non-moisture, hot-air machine will often give wonderful results. As a general rule, it may be taken that hot-air incubators are more economical to run, both as to fuel and attention required, and that hot-water machines are safer in the hands of those who would not style themselves experts.

A slight knowledge of embryonic development is necessary before one can quite understand the phenomena of incubation; and in the first place, let it be remarked that if it were not for the chemical action of the carbonic acid and dioxide breathed by the chick, the shell would be of such strength as not to be possibly broken by the hatching chick.

Immediately under the shell lie two membranes, the outer following the contour of the shell, and the inner lying close to it, except at the larger end, where it cuts straight across. This gives the air space into which the chick has to break to obtain sufficient freedom to attack the shell. Under this again is the

white or albumen, in dense and less dense layers, and floating in the midst of this, enclosed by the vitelline membrane, is the yolk. The outer part of this, the yellow yolk, almost, but not quite, envelops the flask-shaped white yolk, at the mouth of which lies the blastoderm (germ skin). The yolk is so balanced by two cords of thicker albumen, known as the chalazæ, that the germ is always kept uppermost. In the blastoderm, at the very commencement, there was only one germ, but during the period in which the egg is laid the heat of the hen's body multiplies this many times. Thus incubation has always commenced even in a new-laid egg.

The development during incubation is particularly interesting, but it would require too much space to give it in detail. By the second day the embryo is discernible, and has commenced to throw out its yolk sac—its method of feeding. By the fifth day the increasing need for oxygen causes it to throw out its allantois, a network of capillary blood-vessels, which in time reach the shell and oxygenate the blood. On the nineteenth day the chick breaks into the air space and breathes through its lungs, gradually discarding the allantois, and at the same time taking up the contents of the yolk sac. This is the explanation of the chick not requiring food for thirty-six hours after hatching.

The room in which incubation is to be carried on should be carefully chosen. Existing buildings may be brought into use, or a special room can be constructed. Should wood be used for this, the walls and roof are best made double, the interspace being packed with straw. The room will keep a much steadier temperature too if let some 4 ft. into the ground. Iron sheeting should never be used as roofing on account of its conductivity.

A dry, well-ventilated cellar is almost an ideal place, and even if slightly damp it suits the requirements of hot-air incubators. An outhouse or stable can often be made to answer if lined with matchboarding.

A point to be remembered is that an incubator room should be in a quiet place, and away from any vibration—as, for instance, a road upon which heavy carting is done, a railway, or running machinery. The incubator itself should not be in direct sunlight, and never on any account in a draught. Extremes in temperature should also be avoided, 40° being as low as an incubator room should reach.

For very hot weather canvas shutters for the door and windows are very useful, as ample ventilation can then be given without introducing any rapid draughts.

When using tank machines, it must not be forgotten that some

kind of stand is necessary; and a table is best built round the wall with shelves beneath on which to place the egg-drawers for cooling. Another bench will also be needed on which to conduct the turning, lamp trimming, &c.

With regard to the actual working of an incubator, more care is needed than brains. By carefully following instructions fair results can always be obtained. It is, however, with the eggs themselves that the difference between a good and bad hatch often lies. The eggs of mismanaged, wrongly-fed birds—especially those kept in confinement—and immature pullets, should not be chosen for incubation. The eggs of healthy, well-grown pullets are, however, as reliable as any others. Misshapen or very porous eggs should always be rejected; as the one will swell the numbers of the cripples and “dead in shell”, and the others will allow of too much evaporation.

On account of its popularity we will first take the working of a tank incubator, and the following describes the procedure: The machine should be placed on its stand and carefully levelled. The tank is then filled with water at about 115° and the lamp lighted. The regulator requires careful adjustment, and should at first be set slightly swinging, the weight being a third of the distance along the lever. Then by the aid of the milled-head screw the damper should be gradually lowered until the temperature reaches 102° which it should do in about forty-eight hours.

The machine is then ready for the eggs, and these, previously wiped over with a damp cloth to remove dirt or grease or anything which would impede evaporation, should have a distinguishing mark made in pencil on their obverse and reverse sides. An **X** and **O** will answer, or if preferred, the initials of breed and date of hatching. A piece of porous non-conducting cloth, something of a woolly nature, should be laid on the perforated bottom of the egg-drawer, and the eggs placed thereon; care being always taken to have the smaller end downwards, or otherwise, as the germ is to a certain extent floating, chicks will be found wrong way about in their shells, in which position they seldom hatch.

The drawer should not be closed at once, the eggs being allowed to warm up gradually, otherwise there is a risk of bursting the germ skin. The eggs are best left for twenty-four hours to warm up, and after that should be turned twice a day at as even intervals as possible; and at one of them receive the airing or cooling. The duration of this of course depends upon the outside temperature, but with the thermometer at 50° five minutes for the first week, eight minutes for the second, and twelve for the third is about

correct. In very hot weather an hour may be sometimes given with advantage. It should be remembered that the eggs should be aired before turning, or the warmer side of the egg will be turned downwards and imperfect cooling will be the result.

On the fifth or sixth day the eggs are ready for their first testing. This can be done, after one becomes expert, by the aid of a candle; but, for a beginner, better apparatus is necessary, and a special testing lamp can be bought for a few shillings. A very good makeshift is a sheet of cardboard in which an aperture resembling the egg, but slightly smaller, is cut. If the egg is put to this and held up to a paraffin lamp the development can be clearly seen.

The sterile eggs will appear perfectly clear and should be removed; for if any live egg be in contact with an unfertile, the heat which it generates will be partly absorbed by the other, and the live egg consequently kept below its correct temperature. The fertile germ appears more or less dense, though with a powerful light this resolves into a dark spot surrounded by red blood-vessels. A dead germ or broken yolk is denoted by a red line, either round or by the side of the egg. These should be taken away or they will putrefy. The addled egg, found at a later date, presents a cloudy appearance and is a decaying germ which was missed at the first testing. If left in the drawer they soon develop an offensive smell.

Ducks' eggs are particularly easy to test, being very transparent, white hens' eggs coming next, and brown hens' eggs being the most opaque of all.

About the twelfth or fourteenth day the testing should be done again, and any errors of the first time can be corrected.

The subject of the correct working temperature for tank incubators has been much debated, and to satisfy himself the writer once made a series of experiments with sitting hens. In every case he found that the *average* temperature was between 102° and $104\frac{1}{2}^{\circ}$, depending upon the stage of incubation.

In tank machines where cold air enters through the bottom, the under side of the egg is much colder than the upper, and a temperature of 104° on the top of the eggs means that the lower side is only at about 102° . Thus should the draught beneath get colder more heat must be applied above to keep the eggs the same *average* temperature. It was this which caused Hearson to formulate the following rule, which holds good for all this type of machine: When the outside temperature is at 60° , the temperature

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should be 104° above the eggs, and for every 10° rise or fall of the outside temperature there should be a corresponding rise or fall of 1° in the egg drawer.

The best results are obtained by starting the eggs at an average of 102° and rising to 103° at the end of the first week, and 104° to $104\frac{1}{2}^{\circ}$ at the end of the hatch. It will always be noticed that in machines not having the thermostat on a level with the eggs, there will be, if not corrected, a gradual rise in temperature of several degrees as the hatch proceeds. This is to be expected, as the heat given off by the gradually coming to life of the chick in no way affects a regulator some inches above, and consequently the same amount of heat is still radiated by the tank.

Most people are cognizant of the fact that liquids boil at lower temperatures at lower atmospheric pressures, and it must be remembered that as the working of the capsule depends upon the boiling or vaporizing of the sulphuric ether, &c., different air pressure will affect this. If the barometer rise—which means that the atmospheric pressure has increased—the liquid in the capsule will not vaporize until a higher temperature is reached, and consequently the eggs get above their correct temperature before the lamp valve comes into action. Should the air pressure decrease, the reverse is naturally the result. As a half-inch rise of the barometer makes 1° rise in the egg-drawer, and vice versa, this should be forestalled by keeping a barometer in the incubator room and making the required adjustment by the sliding weight.

Perhaps the most difficult thing in working tank incubators is to know just when to add the moisture tray. The more the ventilation, and the more rapid it is, the more is the moisture evaporated from the egg; and to compensate this a tray of water beneath the eggs is a necessity. But if this is given at the commencement of the hatch, the eggs get too much moisture, and if given at a later date it may be insufficient, hence the difficulty.

Practically speaking the eggs should be dried down till the air cell occupies one-fifth of the egg on the eighteenth day, and to get this, in most tank machines, the water tray should be filled on the fifth day. Individual machines differ, and a knowledge of them is only obtained after working them.

The effect of too small an air cell is that the chick is not given the room required to break the shell, and too large an air cell means a dry, leathery state of the membrane, which the chick is unable to pierce.

A trick of undoubted efficacy is to place the water-tray beneath and outside the incubator, and if this is done at the beginning of



Photo. Sport and General

WHITE WYANDOTTE COCKEREL

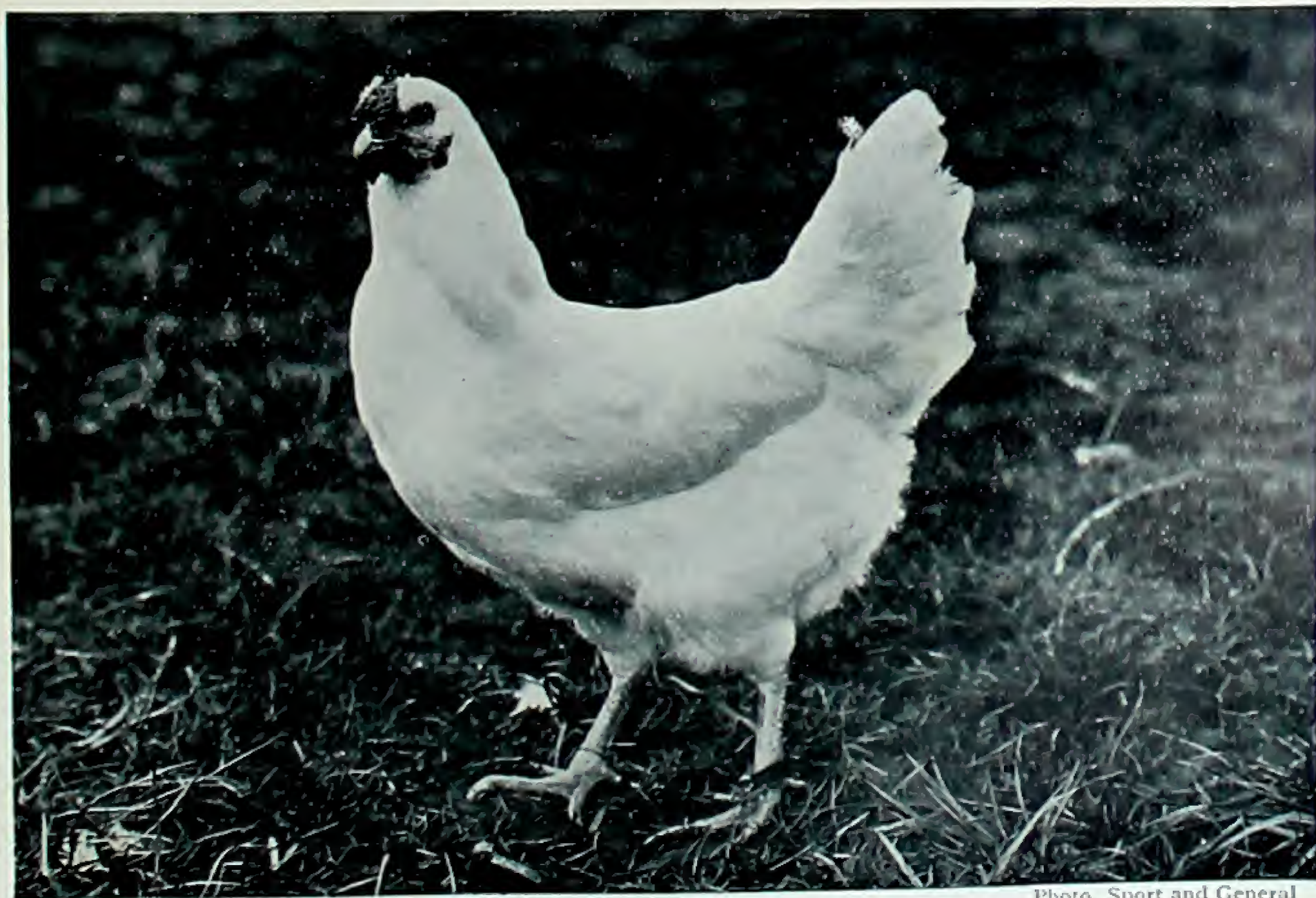


Photo. Sport and General

WHITE WYANDOTTE PULLET



Photo. Sport and General

PARTRIDGE WYANDOTTE COCKEREL



Photo. Sport and General

PARTRIDGE WYANDOTTE PULLET

the hatch the air will be taken in at just the right degree of humidity.

On the nineteenth day the cooling and turning should be discontinued and the eggs left severely alone until they pip, which should be on the twentieth evening. If they pip earlier than this the temperature has been too high, or if later, too low. During the hatching-out period the egg-drawer should not be opened too frequently, or the newly-hatched—and about-to-hatch—chicks will take chills, from which they will soon succumb. On the other hand, the drawer should not be left too long without an inspection, or a newly-hatched chick may become stuck to other shells and so add to the list of losses.

A useful trick, should the hatching not be progressing satisfactorily, is to fill the water-tray with water at about 140° and then close the drawer and give the eggs a thorough steaming. This will soften the membranes, and will usually bring the whole batch off in a very short time. It is more effective than sprinkling the eggs with warm water.

With a strong chick help is rarely needed, and does them more harm than good, but there are cases in which a little timely assistance is beneficial.

The working of a hot-air machine is really very little different from the above-mentioned. The temperature in these is often nearly the same throughout the egg-drawer, and therefore the temperature registered by the thermometer is the average. As with the other patterns, 102° to 104° is the correct heat. The machines which dispense with moisture are the least trouble, but even with these it is advisable to watch the air cells, and it will often be found that a little added water is advantageous. The best way to give this is to procure some shallow pans, and, filling them with water, place them about the incubator room. On a brick floor a pailful of water swilled down every morning has the same effect.

Some machines have a device for turning all the eggs at once, and if this works well it is certainly a labour-saver. Clockwork mechanism for lowering a panel front, and so giving the eggs their airing, is an unnecessary complication. The panel front itself is, however, a useful innovation.

What is known as the "Mammoth" incubator need hardly be explained here. It is more or less a reversion to the old Egyptian methods. If one be incubating to such an extent as to require one of these colossal machines, an incubator expert who thoroughly knows his business should be employed.

ADVANTAGES OF ARTIFICIAL REARING

The use of incubators and rearers makes one independent of the hen, and where table chickens are to be reared in any quantity they are indispensable. There is more room to go wrong in this method, but when properly understood it is superior to the natural one. There is one great advantage. If chickens are kept away from hens and put into clean rearers they will be free from lice. There are many kinds of rearers, some far too complicated, with low chambers and felt houses. A perfect rearer has not yet been made. This would be in sections, so that all the parts could be laid flat in a large pan of disinfectant, thoroughly saturated, and then dried between the hatches. This would prevent the spread of such contagious diseases as septic pneumonia and enteritis. In any case, the simpler the rearer the better, so that it is fitable and can be well sprayed with disinfectant. Some prefer chambers heated by hot-air pipes, others by hot-water pipes; but if the lamps are properly trimmed and cared for there is nothing better than a chamber with a guarded hurricane lamp in the centre; a second cool chamber, also on a boarded floor, attached to the first; and an outside covered run on grass such as has been described. There is now an American importation called a Fireless Brooder, in which the chicks are supposed to keep themselves warm by conservation of their own heat; but it is not making much headway, and some of the largest users do not claim that it rears well in cold weather. Lamp brooders have stood the test of time, and it is certain that chickens can be reared well in them without loss. The best size is what the makers call a "hundred" rearer, but fifty is enough to put in it if one is to get best results. An expert rearer can give more, but it needs more care. When one has once studied the principles of heating and ventilation in a good rearer it is cheaper to make them at home. The writer has most of his so made, and not by a professional carpenter. Although many fail in artificial rearing, the essentials are simple enough. Given correct food, which is treated in another section, the only things are thorough disinfection, correct temperature, suitable floor deposits, and cleanliness. The brooder should have the lamp going for two days before it is required so as to dry it thoroughly. The lamp must be kept quite clean; a new wick every three weeks, soaked in vinegar, then dried and soaked in petroleum; the lamp-container emptied and rinsed out with clean petroleum occasionally; the wick to be long enough to take a turn round in the container; a good brand of oil used; the container nearly filled once daily; and the wick kept

trimmed so that there is an even flame. The starting temperature is 90°. After a few days—more in cold weather, less in hot—the temperature can be lowered a degree a day until it reaches 70°. The chicks will show if the temperature is right, although it is well to use a thermometer at first. By looking through the window, which all rearers should have, one can see at a glance if all is well. If the chicks chirp plaintively and crowd round the lamp they are cold. If they lie sprawling about and pant they are too hot. When the temperature is right they are bright and lively, occasionally closing up together, but often busy raking the loose deposit over.

The best floor deposit is half dried sand and half small hay chaff, or better still, the refuse seeds out of a hayloft. This will not pack solid as would sand alone, nor can it be so moved as to get to the bare boards. About 2 in. deep over both chambers is best. The sand must be dry, but not too dry, and after being in the inner chamber for a few days it may resemble a miniature Sahara, and need sprinkling. Every day the droppings must be scraped off and the sand and chaff freshly stirred up, with a little new put on from time to time. If the chicks' feet become clogged, they must be soaked in warm water and cleaned. If there is an accumulation of dung behind (from some slight error in feeding), it must be sponged off with warm water and the part dressed with boracic acid. More chicks are killed by coddling than anything. In cold weather it is best to keep the rearer indoors for a week, but the chicks should not be kept shut up in the warm chamber after two days old. They need watching for the first day that they go out to the second chamber until they know their way to the lamp, after which they will run in and out, using the lamp as a mother as they would a hen. Chicks are seriously injured by being kept at one high temperature. It cannot be too much emphasized that the warm chamber is only the place for them to spend the night in, and to run to as required in the daytime. In genial spring weather, the sooner they learn their way to the covered run on turf the better for them. After a fortnight they can have perfect liberty on fine days and soon know their way about, and will go thirty yards from the rearer. After three weeks they can be put into a cheap home-made brooder, such as can be made from a bacon-box, with a hurricane lantern in the middle. A corrugated iron sheet will serve for the top. When old enough to be safe from crows, magpies, jackdaws, all of which prey upon them, they can be removed to a field-house. It is best to take the box and place in the house until they are wonted to it, when the box can be removed. To protect them from their enemies there is nothing so good as a rifle.

One can be bought for 45s. which will kill easily at 200 yards. When a crow is shot, it should be torn in pieces and spread about the rearing-ground. Carrion crows are too wary to be reached with a shot-gun, and one pair has been known to kill some hundreds of chickens. So daring do they become that one has been known to swoop and pick up a chicken within twenty yards of a woman. There are few hawks and kestrels, and although they may pick one up, they seldom remain on one farm to keep on killing. Stoats must be trapped. Foxes present a difficult problem, but if it were not for them the poultry industry in the country would probably be quadrupled within a few years. The best time for rearing depends upon the purpose to which the chicks are to be put and upon the capacity of the attendant. Some can grow pullets more in three months than others can in four. Table chickens may be hatched in steady succession from July to January inclusive; laying pullets of the heavy breeds in February, March, and April. This includes Orpingtons, Rocks, Wyandottes, Rhode Island Reds, and Light Sussex. The light breeds, and crosses from Leghorns, Anconas, &c., may be hatched in March, April, and May.

DUCKLINGS

Ducklings are amongst the easiest of birds to rear. They can be hatched successfully by incubators and can be reared artificially. They require less heat than chickens, and will bear more crowding on the runs. As ducks are subject to fewer diseases than fowls, there is not so great an element of risk.

In the villages round Aylesbury the art of rearing ducklings has been practised for generations. All their efforts are in the direction of early ducklings for the London market, when the first comers may reach to 14s. per couple. There they are hatched chiefly by hens, and are reared in rough sheds on earth floors littered down with straw. It is a disputed point whether the fattening ducks do better with no water to bathe in or with one swim daily for about a quarter of an hour. The late Mr. Read, who was one of the foremost duck rearers of his day, told the writer that he preferred the daily wash after the ducklings were some weeks old. The ducks gained by being kept clean, and it gave a chance of cleaning up the pens whilst the ducks were out. At Sidemoor, near Bromsgrove, a great business is done by the nail-makers, who keep hens, chiefly cross-bred Cochins, and set them on duck eggs in boxes in their forges. Despite the continual clang on anvil, the hens hatch well and the young ducklings are sold in great numbers in Broms-



DARK DORKING COCK



Photo. Sport and General

SILVER GREY DORKING HEN



Photo Sport and General

OLD ENGLISH GAME COCK



Photo. Sport and General

INDIAN GAME FOWLS

grove market. Mr. Peter Walsh has a large, old-established duck farm in Lancs., and uses incubators with great success. The writer uses both incubators and hens with about equal results. If hatched by hens, they are best kept with the hen for a few weeks. Early in the year a movable wired frame about 12 ft. by 6 ft. is best, with a small house attached. This can be moved daily on to fresh grass. For midwinter rearing straw on earth floors in buildings is best. In late spring the ducks will do in large wired runs on the grass without any houses. The things most to fear are cramp and leg weakness. The former can be avoided by dry floors to the houses, earth covered with chaff being excellent. The latter is dealt with under "Feeding". Ducklings are very timid, and should not be frightened. They should not be handled or disturbed until ready to go, and all of one hatch should go together. They should not be approached at night with a lantern. When there is occasion to handle them, they should be caught by the neck and so lifted. Both food and water troughs should have a frame with upright bars, so that they can only get their heads through. When put into wired grass pens they must not be very large, or they may race themselves to death. They do best in lots of not more than thirty, although on large plants more are run together. In rearing for stock birds they should have perfect liberty in a field after three weeks old, and should have access to water. When it is desired to pick out the drakes from the ducks, they should be caught and held by the neck until they call. The duck gives a "quack", whilst the young drake does not attain his full note so soon, and gives a harsh, hissing noise. When full grown his note is a short double quack, differing altogether from the noisy series of quacks by the duck. The period of incubation is twenty-eight days.

GEESE

These usually commence to lay about the middle of February. To ensure fertile eggs, it is essential that the birds shall have been mated some months. The eggs will hatch in incubators, but the usual farm custom is to keep the eggs until the goose goes broody, and then set as many as she will cover—usually all. If the goslings are taken away when hatched and reared by hand the geese soon lay again, and rear a second hatch. Many cross-bred geese will do so if they rear the first lot. Some set the eggs under hens, especially with Toulouse non-sitting geese. As the hen sometimes fails to turn these large eggs, it is better to move them by hand daily. If they have any difficulty in hatching out, the eggs should

be rolled between the hands, using a little pressure. The elastic shell bends slightly under this and loosens the membranes. A hen will take about five eggs, and the period of incubation is thirty days.

It is the custom to make pellets with flour and milk (some use gin, but it seems absurd), and to hand-feed the goslings for the first day or two. But they will eat sloppy food as soon as they need anything. Whether running with hens or geese, they must be kept in wire whilst young. They, as well as young ducks, are subject to heat apoplexy, and must be shaded if the weather is warm. The same wired frames mentioned for ducklings are most useful, and they can be shaded by sacking or a canvas sheet over the top. As the air draws underneath, these are cool even in hot weather. The greatest danger is cramp from going into water too early or from getting caught in a severe rainstorm. Table goslings on a grass run do not need swimming water at all. After the first few weeks goslings will live on grass, and where there is the run of common land, it may pay best to let them get their own living until the fattening up for Christmas. But the turkey is ousting the goose for the Christmas trade, and those who run them on good pastures will do better to feed liberally the whole time, in addition to a wired pen on grass, lucerne, or clover. These should reach to 12 to 15 lb. in ten weeks, when there is a demand in large towns at better prices than for full-grown birds.

Geese live to a great age, but are apt to lay double-yolked eggs late in life. From two to ten years old is the best time. Geese rarely are successful in the first season. If a goose dies and has to be replaced, it is better to change the gander, as the old one will probably keep to his mates, and refuse to mate with the new one.

REARING TURKEYS

Success in this largely depends upon the mating. It is the general custom to mate cockerels with pullets. Certainly the pullets lay most eggs, and there is not the danger of their being trampled to death as with old cocks. But the poults are stronger from old birds in the second and third season. Also, it is too risky to use an old cock with pullets. Much depends upon the management of the stock birds, which will be dealt with under another section. Of all stock, turkeys suffer most from close breeding, and this must be avoided. The writer invariably sets his eggs under common hens and rears with them, thus getting the greatest number of eggs from the turkey during the setting season.

Still, turkey hens that can be spared sit well. But they are restless if kept confined with the poults in bad weather, and ordinary fowl are to be preferred. The writer has hatched with incubators and reared with brooders most successfully. The more the older stock is exposed to the weather the more the poults will bear. One gentleman who let his turkeys lead a wild life in a wired wood, allowed them to make their own nests and sit under the bushes. The poults were never housed, and were very strong and reared well. When common hens are used, the management during setting and hatching is as previously described for chickens. For rearing, the covered runs, as already described, are of inestimable value. The grass must be kept short, as a chill in wet grass is almost sure to be fatal. Although they must be kept in the runs on bad days, there is no stock so anxious for liberty, and if confined too long they mope and fret. There is no better place for rearing than a pasture rich with clover following a heavy dressing of basic slag. They are particularly fond of the clover leaf, and will scarcely look at the variety of greens usually chopped up for them. Another excellent place for rearing is a shrubbery, as they can keep their bodies dry in almost any weather, and they get a plentiful supply of insects on the lower boughs, of which they are very fond. Another good place is the fallow headland of a root field. They have the hedge close by for shade, and get a plentiful supply of insect food from the turnip and mangel leaves. In both these cases green food must be chopped for them. Poults thrive well on medium soils, and a rich loam is the best. Of all young stock they will least bear crowding and poultry taint, and it is advisable to choose a piece of perfectly clean land and rear them away from chickens. A look-out must be kept for lice, and the bodies dressed with pyrethrum powder. They are subject to large ticks upon the head. These can be cut off and the head lightly touched with iodoform ointment. Turkeys are very small eaters for their size, but they need more care than any farm poultry until they show the colour in the neck caruncles which is usually called "shooting the red". After this they are the hardiest of stock, and will earn their own living to some extent, especially on the stubbles after harvest. They should be kept well all the time, but the actual forcing on strong foods should not take place until three weeks before marketing, or they will get sick and off their feed.

MANAGEMENT OF LAYING HENS

With any kind of farm stock the most important asset is vitality. The value of any beast or bird for profit producing is decided largely by its digestive system. Therefore we should breed for constitutional soundness, not only using the healthiest individuals but also keeping the breeding stock upon the right foods and under the best possible conditions, so that after a few generations hereditary weaknesses are practically eliminated.

The treatment of stock during the first half of the period it takes to reach maturity decides whether it shall ever be profitable. Therefore great stress is laid upon the correct rearing of chickens up to six months old. The badly-reared chicken never makes a great laying hen.

The amateur has nothing whatever to gain and a great deal to lose by inbreeding, and he will find it best to use unrelated cockerels the whole time. The specialist, whether breeding for show stock or for great laying strains, may find it of advantage to mate relatives for some generations, but that has a limit, after which Nature takes her revenge. Too closely-bred stock is difficult to rear and falls an easier prey to parasitic diseases. No doubt the evils of inbreeding are minimized when nature's methods of weeding out the unfit males by fighting takes place, but with our selection under domestication, which is usually either for colour or egg record, it must soon cease or the strain will become rapidly deteriorated.

The advantage in keeping pure breeds is that eggs and stock birds may be sold at more than consumption value. In breeding for layers, type must be studied. The greatest layers in pure breeds are the small to medium-sized specimens, never the largest. Egg production is the best-paying branch for the ordinary utility poultry keeper.

To get the greatest output of eggs for food consumed the hens should never be more than 5 lb. in weight, and better only 4 lb. This has been the greatest lesson that we have learnt from our Utility Poultry Club's laying competitions; and it is always so, irrespective of breed. Great layers in any breed approximate to one type. Small head, bright eye, not too prominent a chest, long back, wide behind, medium length of leg, fine bone, legs set well apart, upright and heavy fan tail. Such a bird is always up early and goes to roost late, is always alert and active. Those who sell everything for consumption will do well to keep to first and second crosses. There are three great groups of fowls: the Mediter-

ranians, of which the Leghorn is typical; the European breeds, of which the best representatives are Houdans and Faverolles; and the Asiatic descendants, such as Rocks, Orpingtons, Wyandottes, and Sussex.

There is no better laying cross than the produce of a Houdan cock and a Leghorn hen. The non-sitting great-laying hen of the first-named group should always be used to start a laying cross. If the half-breeds are by a cock of the second group, they, for the second cross, must be mated to a cock of the third group, after which it is best to start again from the pure breeds.

These birds are hardy, prolific, and very easy to rear. When table chickens are desired it is better to keep a table-cross pen from which the pullets may be killed as well as the cockerels. A good table cross should be easy to rear in cold weather, quick in growth and maturity, and of good quality when ready. The Faverolles cock and Sussex hen give one of, if not quite, the best of table crosses.

Having decided upon the kinds to keep, the next thing is to consider the conditions under which they shall be kept. Naturally the farmer with plenty of room wishes to keep his fowls at liberty. There is much to be said for and against this system. The worst possible place is to have a large stock of hens just round the homestead, more especially where there is much sludge owing to cattle trampling in and out from the buildings. This drawback more than counterbalances any shelter and warmth from the buildings. Unless the hens can be dry underfoot they are better away from the homestead altogether. Indeed, the acre or so immediately round the farmstead has often carried a large head of stock for many years, so that the surface is sodden with poultry dung. A colony of fifty is as many as should be run together, and these will do well in a grass field if the houses are of the kind to be discussed later. Field birds will get a great deal of insect food during summer, and will only require one feed of grain daily from April to September inclusive. The greatest drawback is that many hens lay away in the hedgerows, and if these are thick at bottom, many eggs are lost. Also, the eggs are taken by rooks and magpies. The greatest number of eggs are laid by birds in confinement. Against this system there is the first cost of putting up the pens, roughly about £12 for an acre divided into four pens. The housing costs no more, the labour of attendance is less, and the birds and eggs are safe from depredations by wild pests. The fowls cost no more in food during winter and only a little more in summer, whilst the output of eggs is always greater. Our ideas of how

thickly fowls may be run have been greatly modified of late years. No doubt many of the evils that were attributed to poultry taint should have been set down to improper feeding. The writer has had small pens of nine fowls in runs of 200 sq. yd. continuously for four years, and owing to applications of basic slag the runs are apparently as clean as when first started, and the fowls are in the pink of condition. This is over two hundred fowls to the acre. If a hundred were run together on half an acre, the land would be unfit for fowls after one season. Evidently much is gained by keeping birds in small lots. Not only are they less liable to contract contagious disease, such as roup, but they have not that continuous unrest and bullying seen in large flocks.

When fowls are in confinement they may be considered safe from foxes if six-feet wire is used and a few inches buried in the ground. This is a great advantage in the districts where hunting obtains, as they are out at peep of day in summer, getting pure air, exercise, and insects. It is very rare that field fowls can be let out before 6 a.m., which means that they lose the three best hours for feeding in midsummer. Where runs are put up it is well to try live willow stakes. If they are let down deep enough with a bar, many will find moisture enough to live. Of some hundreds put in by the writer four years ago on loamy soil into a moisture-bearing layer of sand about 4 ft. below, 95 per cent have lived and made vigorous growth. These also furnish shade for the birds, and in time will cut much useful material. Fruit trees are often planted in poultry runs for the sake of the shade, but it is a doubtful good, as nothing throws fowls out of condition more than eating fruit. In the Worcestershire apple orchards fowls usually go to complete wrecks during late autumn, from this cause.

Where the object is merely to keep in laying hens, stout 3-in. mesh wire will do. If they are for breeding pens, eighteen gauge, 2-in. mesh is sufficient. With very valuable exhibition cocks a screen 2 ft. high should be placed between them, but good ordinary breeding cocks very rarely hurt themselves by fighting through the wire and soon settle down. It is surprising what basic slag will do in the way of keeping small grass runs sweet. Not only does the lime in the slag tend to check parasitic diseases, but the phosphate thickens the turf so that it does not get worn in patches and improves the quality of the grass so that the fowls get the richest of green food. Although slag used on most loams and heavy soils bring out mats of clover as if by magic, yet the excess of nitrogen is so great where fowl are kept on grass runs that clovers do not establish themselves, as grasses are nitrogen

feeders. But the kind, colour, and richness of the grasses are improved almost beyond belief.

A method of poultry keeping which may commend itself to smallholders and market gardeners is to wire a piece of light soil into four squares with a poultry-house standing in the centre, having an outlet at each corner, one into each run. The plots are planted with crops which follow each other, and as they are removed the birds are turned on to the fresh ground. If No. 1 holds the fowls all spring, No. 2 is planted with peas, No. 3 with late potatoes, No. 4 with brussels sprouts, the fowls have the run of three plots in the twelve months. This method has been adopted with success in many parts. The advantages are that the land is manured by the birds, which also destroy insects and plant parasites; the fowls get perfectly clean land in turn, and the digging properly has to be charged to the gardening.

Where there is still less space fowls can be kept in covered sheds the whole of the year. They will do well on 1 sq. yd. to each bird, but they require more attention than under any other system, and if that is not given nothing but loss can be expected.

Intensive poultry keeping, as it has lately been called, is receiving much attention just now. There is nothing new in it, as it has been adopted in backyards for many years. It is necessary in climates where they have months of snow, but in our English winters the semi-intensive system is the one to produce most eggs. This is the one that ultimately will appeal most to the farmer. A large, roomy house, called usually a scratching shed, is erected in any convenient sheltered spot in a grass field to hold fifty fowls. It is so large that the birds may be kept in during snow or storms and often until ten or twelve on very cold mornings. But in all reasonable winter weather they are let out for a few hours every day at least, and often from 9 a.m. to 3 p.m.

HOUSING POULTRY

The principles of poultry housing are the same for all kinds. There must be ample ventilation without draught. Everything must be movable, so that the house can be stripped to its bare walls. The perches must be low, and all on one level. For all fixed houses the earth is the best floor. There must be no crack or crevice; in fact, the house must be wind and rain proof. It is better that the roof slope should be all one way—what is called the lean-to pattern—rather than ridge-roofed, as the house can be kept lighter and better ventilated. There are two kinds of roofs

which answer well, those made of overlapping feather-edged boards, and those made of corrugated iron with a non-conducting packing underneath. Felt soon wears out unless kept coated with gas-tar and sand, and will always be torn off if cattle can reach it. Tongued-and-grooved boarding, run lengthwise up the roof, looks well at first, but, as the boards contract and expand with dry and wet weather, they soon leak at the joints. The best way to deal with these is to cover with iron sheeting. But a better non-conductor than wood is 2 in. of tightly-packed straw the width of the roof supports. If lath is nailed on the under side of them, the 2-in. space between that and the sheets holds it. Wood is undoubtedly the best material for the sides of poultry houses, and $\frac{7}{8}$ -in. red tongued-and-grooved deal, nailed on upright whilst very dry, answers well. 2-in. by $1\frac{1}{2}$ -in.-wide red quartering is strong enough for houses about 6 ft. by 5 ft., but for large scutching sheds the frame needs to be of 3 in. by 2 in.

A mere roosting house should give 8 cu. ft. of space per bird. The best size is 6 ft. by 5 ft., or 30 sq. ft. floor space; 6 ft. high at front, sloping to 4 ft. at back, the upper 2 ft. of the front being inch-mesh wire netting. If the perches are 18 in. from the floor the birds are down far below the draught, and yet the air is quite pure. It is a fallacy to keep birds very warm at night, or they feel the contrast too much when they come out at day. Poultry housing should be merely protection from wind and rain. After a few generations of such housing as this tuberculosis is unknown. These particular field houses are great favourites with the writer, who rears all his young stock in them after they are strong enough to go afield. A dry spot on rising ground is chosen, a piece of 2-in. wire netting set down for the house to stand on, so that vermin cannot scratch under. Stakes are then driven into the ground, and the house nailed to them. These straight nails can be easily wrenched out when it is required to move the house. This size is better made solid and not in sections, as it is so much stronger, and will bear being rubbed against by cattle. It can be lifted by two men, and rolled over on to a cart. It is far better that the slide entrance should not come to the bottom within 6 in., thus leaving space for a floor deposit. The door should not come to the bottom within 18 in., which is easy to step over. Then one can get in without the fowls being able to rush out by one's feet. A loose floor deposit is absolutely necessary. Sawdust is best for the birds, but peat-moss dust, dry sand, and chaff mixed will do. The idea is to have 6 in. depth of some loose dry material into which the droppings fall and dry up quickly; also, it can be forked



Photo. Sport and General

RED SUSSEX COCK



Photo. Sport and General

RED SUSSEX HEN

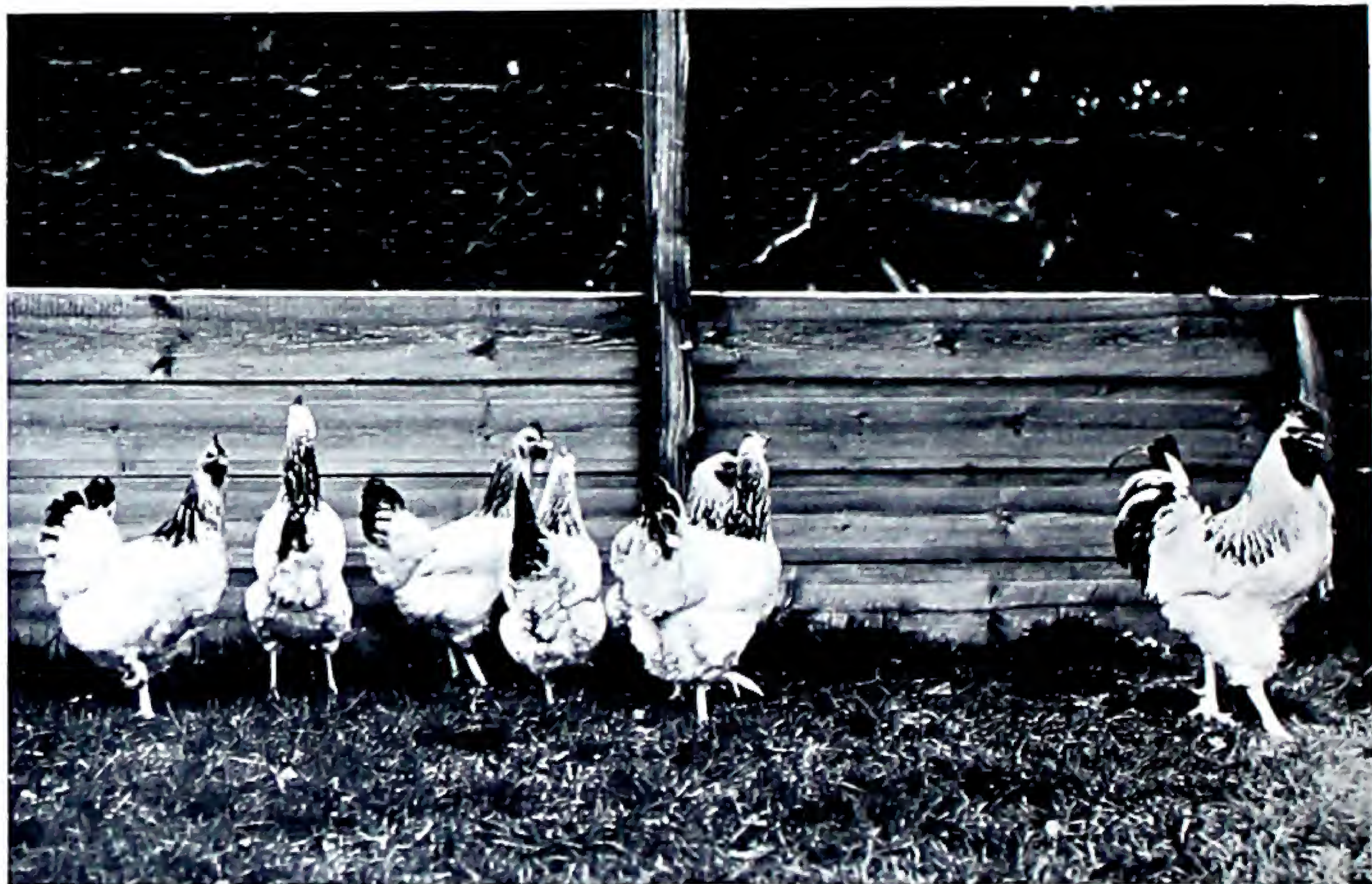


Photo. Sport and General

LIGHT SUSSEX FOWLS



Photo. Sport and General

WHITE LA BRESSE FOWLS

over and kept loose, and will serve for many weeks, thus keeping the house clean at a minimum of labour. This house can be made by anyone. Houses on wheels are much favoured where there is arable land, as they are easy to move on to the stubbles at autumn. The same principles must be observed, and the floor kept covered with sawdust or some such material. The floor, axle, and wheels nearly double the cost of the same cubic capacity.

The best farmer's fixed house and scratching shed combined is 15 ft. square, built with inch boarding on a 3-in.-by-2-in. framework, with iron roof, straw-lined. The front is 7 ft. high, of which the upper half is wire netting. Shutters are affixed, which can be turned right back on to the roof during summer, or can be set by irons at an angle of 45° to prevent rain and snow driving in. No other ventilation is needed. The back wall is 5 ft. high. Two feet from the floor a dropping board, 4 ft. wide, is affixed, and strengthened by sloping stays to the back wall. This extends the whole length of the house. Three inches of ledge at front converts it into a tray to hold sawdust, over which two long perches are fixed at a height of 8 in. The first one is 1 ft. from the back wall, the second 2 ft. from that. The perches are best 2 in. wide, but slightly rounded.

The whole of the earth floor is available for scratching in bad weather, and can be covered with straw to a depth of 4 in. This will accommodate fifty fowls, which is as many as should be kept in one flock. There are no better nesting boxes than orange cases, which can be hung on to nails in the walls, and can be carried outside to sweeten in dry weather. Fowls rarely lay away when the houses are light, airy, and clean. These are, without doubt, the best houses for the production of winter eggs, but to get best results the birds must be let out except in rain, snow, or bitter east winds. Houses should always be set with the open front facing south. When the fowls must be kept in, the water vessel should be set on a stand 1 ft. from the floor, so that no straw or dust can be scratched in.

MANAGEMENT OF LAYING HENS AT LIBERTY

No cockerels are required with hens unless the eggs are wanted for setting. They lay quite as many, and the eggs keep better either for immediate marketing or for preserving. As many doubt this, the following, which the writer can prove, has actually occurred: One pullet laid 292 eggs in 365 days; a hen laid 1000 eggs in five years. Both these birds never saw a male, and both were kept alone in confinement. Feeding is dealt with in another section.

That, housing, and warfare against parasites are the cardinal points in successful poultry keeping. In these large sheds the sawdust should be moved daily, and removed as soon as foul. Once a week the straw should be shaken over to one end of the house, and all dust, droppings, &c., swept out. The floor should then be well sprayed with a strong disinfectant; any of the black coal-tar residues will do, mixed with water, about 1 to 30. After it has dried in, the litter should be shaken back, and some clean added. Sometimes it will need entire removal. The walls, roof, perches, and dropping-board should also be sprayed with the disinfectant, an ordinary brass window syringe serving well for a few lots. On a large poultry farm a pump spraying machine is a good investment. The worst parasite is the red mite, which can be found in clusters in cracks or in the slots where the perches rest. Spraying with petroleum will keep these down, but in a properly constructed house, treated as before advised, probably none will be present. Body lice the fowl will rid themselves of if provided with a roomy dusting bath in which is dried sand, wood ash, and a little lime. The scaly-leg mite can be entirely eradicated if all the fowls are caught twice yearly and the legs dipped in petroleum up to the feathers above the hock.

AGE FOR BEST LAYING

Pullets of the first year lay the greatest proportion of winter eggs, and therefore are the most valuable. With the heavier breeds they also usually lay most in number. For instance, Faverolles are often great layers in the first year, but not after. Medium breeds, such as White Wyandottes, usually lay more in the second year, although not of so much monetary value. The lighter breeds of the Leghorn class often lay as well into the third year. Much, however, depends upon the feeding, which may easily ruin a pullet for further work before she is a year old, and also develop weaknesses which render her unfit for breeding. To know the age of the birds all pullets should be leg-marked either by a toe punch or by rings. With rings copper wires may be used for two years, one leg for first year, and the other for the second. Steel rings may be used for the third and fourth. The wire rings used for ringing small pigs are cheap, and serve the purpose. Some of the coloured celluloid spiral rings are very good; others weaken in wet weather, and come off.

For breeding purposes any pullets that have set up good records may be bred from until the fourth year; as the object here is not so

much to get quantity of eggs as the right kind of stock, and fourth-year hens will lay during the spring, when eggs are wanted for setting. For early chickens, strong early-hatched cockerels are best. Second-season cocks are usually not very active before March, but this depends largely upon individuals. Leghorn cocks are vigorous much longer; indeed, the heaviest breeds, such as Brahmas, are rarely reliable in the second year. There is an idea abroad that cocks should be taken from the hens and rested, except in the breeding season. The writer's experience is opposed to this, and he never removes the cocks from the hens. One four-year-old White Leghorn that has never been away from hens has this season fourteen hens, and his eggs are very fertile. The manure from poultry is a profit of itself. By its use, combined with basic slag, a poor clay soil, growing gorse and heather, has been transformed into good fattening pasture in the last four years.

MANAGEMENT OF STOCK DUCKS

Ducks are usually kept as we keep table fowls, merely to rear as many as possible from one set, recognizing that they do not pay in eggs sold for consumption. The exception is the Indian Runner and a few small breeds of modern manufacture which contain Runner blood. In the large breeds it is not usual to allow more than three ducks to a drake. With very highly bred exhibition Aylesburys this is the outside number. In America, many more are allowed with utility Pekins. With common ducks four to a drake will be safe, and as many when we are crossing Aylesbury and Pekin. In these breeds it is better to keep stock ducks only two years, and it is advisable to change the drakes on alternate years, so that yearling drakes run with two-year-old ducks, and vice versa. Young ducks of the first year lay earlier than those of the second, and therefore those catering for the earliest trade may always keep to early-hatched yearling ducks. Indian Runners may have six ducks to a drake, and can be kept a year longer, as they are quite prolific enough in the third year. All stock ducks are better for water to swim in, as mating takes place with more safety in the water. The active Indian Runners seem more independent of water, and where these are kept merely for laying they will do without. Running water is better than a pond, as they soon foul stagnant water. The only objection is that they are apt to stray; but in that case they should only be fed at evening, and then they will come home for it. Stock ducks require a roomy house and a dry floor. Although they can live almost wholly upon water, they quickly

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succumb to damp floors. A field poultry house, with raised earth floor covered with straw, serves admirably. Duck houses are usually made lower than those for fowls, but there seems no reason for this, as all poultry is better for plenty of room above.

Ducks must not be let out early in the morning or they will lay away, and after they have once commenced they will hold their eggs to take away if possible. If stock ducks are in a large wired grass run and not let out until the middle of the morning, all the eggs will be secured. They will only use the house during very cold weather and are under perfect health conditions. As will be noted under another section, ducks require to be fed very heavily, and if the right foods are not given will lay shell-less eggs.

STOCK GEESE

Toulouse and Embden ganders will usually mate with three geese, but there are birds which will only take two and reject one. Chinese ganders will take more. Water is required to ensure fertile eggs. Geese in their first year rarely go broody, but after that the Embden and crossbreds all do. Pure Toulouse will not sit. The tendency to getting fat on grain increases with age, and it is doubtful whether it pays to keep stock geese more than twelve years, although they will breed for half a lifetime. The laying varies much according to the breed. Following the universal law of size and production the small Chinese lay most frequently, averaging 40, and occasionally reaching to 60. The small Russian geese are also very prolific. In some carefully-conducted experiments Toulouse averaged 26 eggs, and Embdens 18½. Individuals will lay far more. No especial care is needed, except to prevent the stock geese getting too fat. A similar house to that required by ducks will serve, or indeed almost any outbuilding bedded with straw. It is not easy to distinguish between the sexes. Crossbred ganders are almost always white, whilst the geese are often coloured. The male is usually a little larger, the goose deeper in the body, and slimmer in head and neck. If a flock is divided by being driven on both sides of a wall the birds call to each other, the gander's note being long, loud, and shrill compared to the goose's. The only certain way is by physical examination, but this must be most carefully done.



Photo. Sport and General

AYLESBURY DUCKS



Photo. Sport and General

PEKIN DUCKS



Photo. Sport and General

ORPINGTON DUCKS



Photo. Sport and General

ROUEN DUCKS

TURKEY MANAGEMENT

For exhibition one naturally breeds from very large birds, but they are not so prolific as smaller ones nor are the eggs so fertile. To produce ordinary market stock a pullet 14 lb. and a cockerel of 20 lb. are large enough. The birds should be strong in limb, long in keel, and the dark-legged birds are considered the stronger. Varieties have been dealt with elsewhere, but the fact that the American Bronze is kept in such large numbers seems to show that it is the most profitable. The cockerel influences colour more than the pullet. The cockerel of medium size and not too long on the leg will mate with ten to a dozen hens. Although one mating will usually fertilize the whole clutch of eggs until the hen goes broody yet if the sexes run together mating takes place fairly frequently. No stock suffers more by being kept in badly-ventilated houses. A shed with the whole front wire netting suits them well. Where safe from foxes they may roost in trees the whole winter and the poults will be the hardier for it. One of the greatest troubles is that, owing to their recent domestication, hens wander very far and make nests in most out-of-the-way places, so that it is almost as much trouble to find the eggs as they are worth, and many are taken by rooks. The strange thing is that turkeys can be wonted to a small spot. One set of the writer's is so attached to a small orchard that they rarely leave it when the gate is left open. Others have done well in quarter-acre poultry runs. This is so opposed to the general belief as to be worth mentioning. If the turkeys are confined in six-feet wire (with one wing clipped) for three weeks, about when they are starting laying, and nests are made for them under bowers of sticks, they will lay in those nests afterwards if given liberty. The number of eggs varies much, and depends upon the feeding. But 30 may be taken as a general average, whilst 120 have been known.

The greatest mistake is to allow the stock hens to remain with those fattening for Christmas. This leads to infertile and shell-less eggs, to liver trouble, and weak poults. This will be more fully gone into under "Feeding".

Turkeys are small feeders, and no stock pays better when the art of rearing is mastered. The birds are so quiet that they can be driven as easily as sheep. On a large arable farm a flock of two hundred will pay for a boy to drive them to the stubbles. In the autumn they are great eaters of acorns, beech nuts, and haws. As they are handsome and gentle alive, and delicious on the table, there is no wonder that they are increasing in popularity at a great

rate. Their greatest enemy is the comparatively new disease, "coccidiosis", which is spreading with such rapidity that if no cure is found it will soon pronounce the doom of the turkey.

FEEDING

CHICKEN FEEDING

Nearly all the mortality in chickens up to six weeks old is caused by improper feeding during the first fortnight. They may die of infectious white scour or anything else, but the weakening that renders them an easy prey to inimical germs has its origin in wrong foods. It is no exaggeration to say that nine-tenths of the chicks are reared upon foods that are in many ways unsuitable. And this is largely because the foods sold for rearing are for the most part made up by corn merchants with no knowledge of the requirements of young chicks. When a poultry farmer is found who can rear practically all, he is certain to be making up his own mixtures. When one has reared many thousands, one has had the opportunity of noting cause and effect. When one has made post-mortems on many hundreds for the public and enquired in every case as to the exact foods that they have had, one gradually establishes a connection between certain foods and certain intestinal conditions, and learns to eliminate any grains or seeds which in all cases seem to lead to trouble. It is surprising that so many erroneous ideas have been accepted on the subject of chicken rearing. Many withhold water under the impression that it causes diarrhoea. Impure water does, but the rearer has only himself to blame for that. It is certain that chicks, reared on what natural foods the hen can find in the fields, drink water freely, and yet all rear except those which succumb in wet weather from continual chills. The food must consist chiefly of animal and vegetable matter with no grain at all, and this bulk approximates more to soft food than hard corn. Yet, unfortunately, this craze for dry feeding has received sanction from those in official positions in the poultry world. Chickens can be reared in many ways and on many different dietaries, even on bad ones, but they never make so fine stock; even as slum children may be reared on insufficient and improper food and in insanitary surroundings, but show the effect all through their lives in impaired vitality and stunted frame. What we want to know is the food which will rear all except nest weaklings and those which meet with accident, which will give the greatest growth in the time, and birds sound in

outward structure and in internal organs so as to be fit to reproduce their kind. The dietary given here is doing this in hundreds of yards at the present time, and the reader has only to follow this teaching implicitly to secure the same results. Ninety-two chickens were placed in a hundred foster-mother, and despite the overcrowding the whole were reared and made full-grown stock. This is probably a record, and it was done on these foods.

The theory and practice of chicken feeding agree, so that it is as well to briefly consider the former before going on with the latter. Only a few hours before hatching, the yolk sac and remainder of yolk food which has been lying outside the chicken is drawn into the body at the part corresponding to the umbilical cord in mammals. There is enough yolk left to maintain the chicken for some days without further food. In a state of nature the hen merely nurses the chicks at nearly incubator temperature for the first two days, and they get very little food for several more. This should prove to us that fasting at that early stage is beneficial. The digestive organs thus get to work gradually and are not overtaxed at first. So that the practice of giving no food but only small flint and water for the first two days has a sound scientific basis. The first food should be of a laxative nature so as to assist in relieving the bowels. A little stale bread crumb soaked in sweet milk and squeezed fairly dry just meets the case. For the next day there is nothing so good as canary seed, not only for its easy digestibility, but also for its composition. The practice of giving hard-boiled egg has nothing to commend itself, as it is one of the most indigestible of all foods. There is nothing which seems to vary so much from its raw to its cooked state. In its raw state the chicken has been living upon it, therefore its composition is worthy of attention.

All foods can be divided by chemists into six component parts, two of which are merely husk and water. The other four must be considered: (1) The albuminoids or flesh-formers, which go to form the muscular parts of the body; (2) the oils and fats, which are chiefly used day by day in maintaining the vital heat; (3) the carbohydrates, chiefly sugars and starches, whose primary work is to store up fat for the necessary coating of the organs and for reserves to draw upon in time of need; these are to some extent interchangeable; (4) mineral salts, largely phosphate of lime, which take first place in growing bone.

With full-grown stock almost any combination of foods will furnish enough bone-forming material; but with young growing things this has especially to be considered. Egg yolk contains 16 per cent albuminoids, 30 per cent oil, and 1 per cent salts; whilst

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the white has 12 per cent albuminoids, 2 per cent fat, and a little over 1 per cent salts. The rest is water with no carbohydrates at all. There should never be any sudden change in feeding even with larger and older stock. It is obvious, then, that a direct change from eggs to a food like wheat, with 70 per cent of carbohydrates, chiefly starch, cannot be the best method. The continuing food from the shell should at least contain plenty of oil, albuminoids, and salts. The average of millet, dari, and maize is even worse for our purpose than wheat, yet these form part of most chicken mixtures upon the market. Vegetable albuminoids vary in digestibility, and we know that peas, beans, soya, and foods of that class have to be used with care even for cattle and sheep, and that the strongest stomachs can only take them in moderation. Therefore they should have no place in a chicken dietary, neither should lentil. Milk has a composition so nutritive that if all the water is dried out except the little that is found in grain it has 28 per cent albuminoids, 24 per cent oil, 33 per cent carbohydrates, and 5 per cent of salts. We know, further, that milk alone will furnish all that a mammal requires for some months. We should expect, then, that milk would be one of our most valuable aids in rearing, and in practice we find it so. If milk is given in liquid form the chicks smear themselves with it and the dust adheres to it. If given when just fermenting it may set up bowel trouble. With strong chickens it may be used perfectly sour and clotted. But with young ones the safest way is to cook it with grain so as to form puddings, and these must be used up whilst fresh.

	Albuminoids.		Oil.		Carbohydrates.
	Per cent.		Per cent.		Per cent.
Canary seed contains about	17	.....	20	.....	33
Linseed " "	33	.....	10	.....	35
Hemp " "	10	.....	21	.....	45
Groats " "	18	.....	6	.....	63

The high percentage of the two first columns shows why these are used. Chickens fed with these are always smooth in the feather, and as a rule feather very quickly—an important matter in cold weather. Necessary as linseed is, the chicks are not particularly fond of it, so that is included in the cooking mixture. Oatmeal, if given raw, is rather indigestible, and as its analysis and results in practical use show it to be indispensable, most of it is given cooked. Rice has a stomachic value, and although its composition is largely of starch, yet it regulates the bowels and checks diarrhœa. Buckwheat is added for the sake of variety and wheat

is given because it is the freest from indigestible fibre of all the common grains. The exact formula is as follows:—

For 48 hours give nothing but small grit and water. Third day, stale bread soaked in sweet skim milk and squeezed fairly dry; also canary seed. Fourth day, add puddings made of the cooking mixture as follows: Groats, 3 parts by weight; wheat, 2 parts; rice, 2 parts; linseed, 1 part; buckwheat, 1 part. About 1 lb. to 1 qt. of skim milk, cooked in shallow tins for an hour and a half, will come out a fairly stiff pudding. This is turned out to cool, and dried off to a crumbly state by rubbing in thirds of best quality or fine biscuit meal. On the fifth day they commence on the "stock dry chick feed": Canary seed, 3 parts by weight; wheat, 2 parts; groats, 2 parts; rice, 2 parts; rolled breakfast oats (which are already cooked), 2 parts; hemp seed, 1 part. About half of this and half of puddings. After three weeks the dry mixture is cheapened by adding more wheat and, later on, oats. By the sixth week they will do on 1 part "stock feed", 1 part wheat, 1 part oats, and the pudding can gradually be withdrawn in favour of ordinary thirds and biscuit meal soft food. No animal food is needed as long as milk is given, after which fish meal is best, being very nutritious and easily digested. Many fish meals have the objection of too large a percentage of oil. This is more especially the case with those made from all or part herrings. The best fish meal should have 55 per cent albuminoids, 17 per cent phosphate of lime, and only 3 per cent oil. This proves that it is made from all-white fish. For green food, shallow boxes should be filled with sandy soil and sown with wheat, oats, or a handful of dry chick food. A piece of inch-mesh netting can be nailed over the top so as to be $1\frac{1}{2}$ in. over the soil. If these are watered and kept in a warm place, the green shoots quickly come through the netting, and one can be placed in the chicken run. They will peck off all that grows above the wire, and a box will last for many days. This overcomes the difficulty for suburban poultry keepers.

On the farm there is nothing so good as the rich clover grown by liberal applications of basic slag, of which the chicks are particularly fond. For grit, fine flint and small oyster shell at first; by when they are two months old they will do on the medium or ordinary fowl size. As soon as the milk is discontinued the fish meal should be added to the soft food in the proportion of 5 per cent, or a twentieth part of the total food by weight. By two months old double as much may be given. The next best animal food is boiled entrails. Fish bone (the 17 per cent phosphate of lime) is easily digested, and furnishes all the bone-forming material

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in a safe form. There are no rickety or weak-hocked chickens, and even the breastbones will stand more pressure than those fed in the ordinary way. Animal bone meal should not be given to chickens at too early an age. Where there is a large supply of separated milk, no other bone-forming food is needed. All the soft food can be mixed with it, and some can be curdled with rennetine powder, cut up and drained in a strainer, so that the chickens can be fed with the curd. A constant supply of pure, cool water is of the first importance. Fresh water should be given three times daily, and the vessels emptied and wiped clean each time. Many kinds of fountains are on offer, and one can be made by suspending a glass bottle full of water with the mouth in a saucer of water. But the gain is problematical, as their only use is to hold a large supply, and we have seen that the water is better cold and fresh. Defective tinned and enamelled iron pans can be bought which answer admirably, the enamelled ones being particularly clean. If the water is from a pond and not quite above suspicion, a few grains of permanganate of potash can be added to a bucketful, or perhaps better still, three drops of carbolic acid to the gallon. Particular attention must be given to the water in the brooders.

The necessary number of times for feeding has been much exaggerated in poultry books. Five times daily is plenty from the first, and as soon as they forage freely three times is sufficient. Where nearly all have gone astray is in giving the wrong kind of food and trying to remedy that by extra care in other directions. The great thing in rearing is to distinguish between the essentials and the non-essentials. After the chicks are drafted from the rearing ground to more distant field-houses, it simplifies matters to have an automatic feeder in the house. This can be made of a sheet-iron shoot, 8 in. wide at top and narrowing to 2 in. at bottom, where is a little hole covered by an adjustable slide. The semi-circular iron shoot is nailed on to a stout board, which is hung on to a nail on the side of the house. The spout feeds into a small trough, also semicircular, and the chickens stand upon its edge and feed at will without any waste. At 6 a.m. they should be let out and fed with soft food. The feeders are filled, and they help themselves during the day. Where the greatest growth possible is required, it may be as well to give another soft food about 4 p.m. They will always eat a good soft food in preference to corn, although both are necessary. Fed exactly as above, a Barred Rock cockerel weighed $9\frac{3}{4}$ lb. at six months old last year. So much has been said about dry feeding that it is necessary to

state the case exactly. Chickens will rear on all-dry food, but the rate of growth is not satisfactory. Fed as above, the cockerels will be ready to kill at three months old, and will be quite fat enough straight from the grass runs. To give all-soft food would be to get weak, flabby, overgrown chicks that might go wrong at the joints, just as a foal may if overdone. The half of dry corn is better for the digestive organs, which should be fully worked but not unduly taxed. Where feeders are not used, the chickens, after two months old, will do if fed three times daily. They do not eat any more by having access to feeders. Neither does the presence of food prevent foraging. A chicken would rather hunt for flies and insects than have the daintiest of all dishes. The supply of soft food must always be limited to what they will clean up greedily, or they will not eat sufficient grain.

FEEDING DUCKLINGS

Ducklings are so omnivorous that they may be reared in many ways, in fact little comes amiss to them. There is nothing better to start them on than bread and milk, followed by the cooked foods as recommended for chickens. In the United States, where there are huge duck ranches, many rear on two-thirds bran, one-third maize meal, with about 5 per cent of sand moistened with milk. After the fifth day 5 per cent meat is added, and by five weeks old they get up to 15 per cent meat. This is usually beef scrap or ground greaves. Ducklings will certainly take more animal food than chickens, and will do with a larger proportion of soft food. In every case where tried, fish meal has given greater growth than any other food. The great idea is to keep to nitrogenous foods at the start up to five weeks old, and then gradually get them on to the more fattening foods. In addition to the bread and milk and puddings, sharps and fish meal in the proportion of 4 to 1, with wheat placed in a shallow trough of water for the grain. Boiled roots, scalded clover meal, freshly-cut clover, lucerne, and vetches will all serve for the bulky green food. After a fortnight they will do well on the sharps and fish meal as the staple food, with a little of the puddings or oat-meal porridge. One of the largest American feeders uses a fifth part Quaker oats. By the fifth week a little stronger food should be added in barley meal and maize meal. In addition to the fish meal, which has now reached 10 per cent, a little rough butcher's fat may be chopped, up to 5 per cent. Boiled maize may take the place of maize meal. During the last fortnight they should be

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chiefly on barley and maize meal, with the fish meal and fat and a little soaked wheat. Then they should be ripe by nine weeks, or when they are in the first feather. This must be watched for, as they should be killed before the next growth of small pin-feather appears. If they cannot be kept clean on straw or grass, they should have a wash for a quarter of an hour daily. Dibbling for wheat in the water-trough keeps the head and nostrils clean—a matter of great importance. Geese will rear on the same foods, but unless rapid growth is required to get them off young, they will after a few weeks live entirely on grass.

FEEDING YOUNG TURKEYS

There is an idea that young turkeys need to be taught to eat, and some put ordinary chickens with them for the purpose. This is quite unnecessary, as they will eat as soon as they require anything. The writer has reared turkeys successfully for many years, and everything stated here has been fully put to the test. The same foods that rear chickens so well, as before given under that section, will rear turkeys perfectly. Delicate as they undoubtedly are in the first few weeks, an error in feeding is followed by disaster sooner than with chickens. Egg is given more with turkey poults than any young stock, and some will continue to use it. If they must be given, the safer way is to make light egg custards with milk, but if they are boiled hard, they should be boiled for twenty minutes. Clean water must be given, and grit is of more importance even than with chickens. Small flint or round pebble will do. They will be quite happy sorting over a bucketful of small pebble, which can be obtained from a scour in a stream, and will pick out all of suitable size. Readers are referred to the disease called Blackhead and Coccidiosis, or perhaps Entero-hepatitis, in that section. As this is particularly fatal to young turkeys, they should be fed in troughs, so that they may not at any rate pick up the germs of the disease off the ground with their food. The troughs should be scalded daily, and occasionally washed with disinfectant. In place of the cooking mixture given in the section on chickens, a meal made of whole wheat, wheat germ, fine oatmeal, linseed, buckwheat, biscuit, dried milk, fish meal, and a little tonic spice, has this year been used with excellent results. Nothing grows them so strong in bone, and no other animal food is so easily digested as fish meal, and for the last two years the winning turkeys at the Dairy, Palace, and Birmingham have been reared with it. As with chickens, the change is gradually made on to cheaper foods.

but whilst growing, the food must always be on the nitrogenous side.

It is an accepted custom to give turkey poults plenty of green food, and *freshly-chopped* nettles, dandelion, lettuce, mustard, and cress may be given twice daily. But where the pastures are rich in white clover, as follows the use of basic slag, the poults will pick that in preference, and may be seen grazing like sheep. Observing this, the writer has this year discontinued all other green food, and the turkeys have gone on splendidly. The rather expensive chicken foods should be used until the turkeys have the red colour in the neck caruncles, after which they may be fed with sharps 3, biscuit 1, fish meal 1, for the soft food, and wheat and a few short oats for grain. Later they may earn most of their living on the stubbles, but the soft food should be given at night when they come home. A month before killing a stronger diet should be given, and, in addition to the above, barley meal, maize, peas, and beans should be commenced. They should be given as much as they will eat three times daily, soft food predominating. They are best fed in troughs, which can be removed after they have had their fill, food not being allowed to stand before them. Birds of such a restless nature are apt to fret in confinement after so much liberty, and it is questionable whether it ever pays to shut them up for fattening. Neither should the forcing diet be commenced early, or they will go sick and off their feed before Christmas. With these foods, and the covered runs before advised for use whilst they are small, turkeys can be successfully reared at a profit, as they are small feeders for their size, and make a high price per pound. Being caught in a slight shower does not hurt them, but trailing through wet grass does, and their rearing field should be kept short by sheep, and if these fail to keep the bents down, it is better to run a mowing machine over it.

FEEDING LAYING HENS

In a popular work it is not advisable to dwell too much upon the chemistry of foods, the more especially as chemical analysis without a knowledge of the action of foods upon the body, which can only come by long experience, is most misleading. We should be safer in taking the opinion of an old poultryman who could not read than that of a chemist who had not kept fowls. It must not for a moment be supposed that the animal flesh-formers can be replaced by the vegetable. If this were so we could dispense with meat of any kind. But vegetable albuminoids, of which peas and

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beans have about one-quarter of the total weight, are not only indigestible, but dangerous. Fowls fed heavily upon peas, beans, and vetches die suddenly from apoplexy. Nearly all the troubles with poultry arise from improper feeding. Until recently grain of various kinds was almost the only food used, and the result was that hens were worn out for laying purposes at the end of the second year. Taking the natural life of a hen to be ten years (some have lived to twenty), it seemed absurd that the profitable productive period should only be one-fifth of it. Now, the finest egg producer the writer has ever met keeps his hens for four years, and this he attributes entirely to the feeding. When the feeding is sufficiently narrow, that is, contains enough of digestible albuminoids, the birds do not get caked with internal fat, and such diseases as enlarged livers, weak heart, weakened blood-vessels—leading to apoplexy, oviduct and ovary ruptures, breaking down and protrusion behind—are unknown. Maize is the most abused of all grain. In winter it may be used in moderation, especially with Leghorns and light breeds generally, but it is questionable if it should be used at all with birds in confinement, or with the heavier breeds even at liberty. Fowls of the Orpington class are much more prone to the laying on of internal fat than the small, active breeds. Of all food barley is the most unsuitable. It has neither the merit of cheapness nor of high chemical composition; it is not a good egg producer, and its action upon the system is disastrous. In the chalk districts, where barley is much grown, and fowls are fed chiefly upon it, there are more enlarged, soft livers than in other parts of England. In Lincolnshire the difference between the fowls in the barley-growing wolds and those in the wheat- and oat-growing clays is very striking. Barley is for fattening stock, but not for producing. On the farm it is used for bacon pigs, but not for milking cows, growing calves, and working horses. Here we have the effect of many years' experience.

Rye has no exceptional feeding value; its analysis is slightly lower than that of wheat, whilst it makes about the same price. The fowls are not very fond of it.

Wheat is one of the safest and best foods that can be used. It is too starchy to be given alone, and fowls fed solely upon it get too fat for best laying. But it is a cooling and slightly laxative food, and has nothing like the injurious effect of maize and barley, even though the birds might get as fat upon it. The fowls like it, and the price usually places it within reach. When possible it should form a large part of the dietary.

Oats are the nearest approach to a perfect food. They have a

high analysis, and are particularly suited to laying hens. They are not fond of them at first, but will eat them readily when accustomed to them. Only heavy, short oats should be used. The novice can best test them by placing a handful in a bowl of water. If most of the grains sink at once it is a good sample; if most float on the surface it is not good enough. In Sussex they have a special method of milling oats for the poultry fatters, by which the husk is cut down so that the meal is a very fine and smooth powder. Sussex ground oats are not always pure oatmeal, and they are too expensive for laying hens. There seems no especial reason for using them, as fowls can easily digest whole oats, despite the quantity of husk, which is usually about one-fifth of the whole. Fowls cannot be overfed on oats. In one of the most successful laying competitions held by the Utility Poultry Club, the fowls had all other food measured out to them, but feeders with oats in were always before them, and they kept in excellent condition. Some of the largest Orpington breeders use very little other grain, and say that only with oats can they get fowls into high condition for laying without getting them too fat. It is significant that when hens are put on to various kinds of stubbles at autumn they usually lay best after oats.

Bran has a good analysis, and is often at a reasonable price. If given in soft food it is too laxative, but given dry in feeders or hoppers gives very good results. The broad-flake bran is best.

Sharps (often called thirds, toppings, middlings, dan, and a host of other local names) should consist chiefly of the inner skin of the wheat and the germ. When pure wheat offal can be obtained, this should be the bulk of the soft food given. A good sample is neither branny nor white and floury, but is soft to the touch and nutty to the taste. Many inferior samples of sharps are sold, being made up from pollards, wheat screenings, containing weed seeds, and sometimes still more deleterious ingredients.

Buckwheat is most esteemed in France as a food for fowls, and it is said to make the flesh white; but it has a lower analysis than wheat, and is dearer.

Dari has also a similar analysis to wheat, and may be used if wheat is exceptionally dear, but as a rule is worse value.

These are the chief grains. The chemical composition of foods is dealt with elsewhere in this work (Vol. II, Chapter II), but the constituents of some of the foods important in connection with poultry, and which do not come within the description of ordinary farm foods, may be given here. The nearest round figures are given only, this being sufficient for all practical purposes.

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				Albuminoids.		Oil.	Carbohydrates.
				Per cent.		Per cent.	Per cent.
Millet	13	3	57
Dari	10	4	68
Hemp	...	...	...	10	.....	21	45
Canary seed	...	...	...	17	.....	20	33
Groats	...	...	...	18	.....	6	63
Dry meat meal	...	...	...	71	.....	14	—
Horse flesh	...	...	...	22	.....	3	—
Freshly cut bone	...	...	...	20	.....	26	—
Fish meal (herring)	...	...	...	48	.....	12	—
„ (white-fish)	...	...	...	55	.....	3	—
Skim milk	...	...	...	3	.....	$\frac{1}{3}$	5
Egg yolk	...	...	...	16	.....	30	—
Egg white	...	...	...	12	.....	2	—

Although it is folly to rely merely upon the chemical analysis, yet it is equally unwise to disregard it. A poultry dietary should never contain an excess of carbohydrates (sugars and starches). A mixture of 3 lb. wheat, 2 lb. oats for hand corn, and 4 lb. sharps, 1 lb. white-fish meal for soft food, has practically an albuminoid ratio of 1 to $3\frac{1}{2}$; that is, 1 part of flesh-formers to $3\frac{1}{2}$ of heat-givers, which is about correct. If a change has to be made, from any alteration in price, it will be seen by the table that all ordinary grains approximate much in analysis except maize. With any mixture of them, one-tenth part of the whole made up of fish meal gives a correctly-balanced food. If maize has to be used, a little more fish meal will correct it.

The most important part of poultry food is the vegetable. In summer nothing equals a rich growth of clover. Lucerne comes next. A grass run on good land is sufficient in summer, but in winter green food should be added. Best clover, ground to a meal, or even cut into very short chaff and scalded for some hours before mixing in the soft food, is excellent. Raw cabbage, boiled carrots and swedes may be given for variety all winter. After 1st March mangels may be used in moderation, but they are not at their best until May, by when we usually have grass enough. The poultry keeper who neglects green food will never be really successful. We should not forget that the natural food of a wild fowl is insects, grass, nuts, berries, grubs, and a little grain at autumn, and that excess of starchy grain is responsible for nearly all the troubles of poultry keeping. Potatoes do not take the place of green food. They consist largely of starch and more resemble wheat. When used in conjunction with grain, disaster is inevi-

table. The writer once saw two turkey hens that had been shut in a pen full of grass and forgotten for a fortnight. They had sunk a little in weight, but were in perfect bloom and health, and within a few weeks one won second, open class, at the Dairy Show. This emphasizes what green food can do.

Next in importance to the green food is the animal or nitrogenous. Of this, fish meal is by far the best. It has only recently come into general use in this country, but is now used by many of the leading agricultural colleges and the largest poultry farmers. It has been in great demand in Germany for some years, and all the best made in this country has been going there until the last two years. The use of it is extending beyond poultry, as it is found to be of equal value for pigs, and so easily digested that it may be safely used with thirds and oatmeal for the first food for young calves, its high percentage of albuminoids taking the place of linseed cake. The food has had some prejudice to fight down. Raw fish will taint the eggs, and it was supposed that fish meal would also. But this depends entirely upon the quantity of fish oil present. Common meals with 11 per cent of oil are not to be commended; but a meal made from white fish, cooked at a high temperature and containing only 3 per cent of oil, is easily digested, will keep good for six months in a dry place, and, given in the proportion of one-tenth of the total dry food, will keep hens in perfect health and at the highest pitch of proficiency. Its constant use practically eliminates enlarged liver, oviduct trouble, such as rupture and breaking down behind, and leads to an easy moult.

The next best food of a nitrogenous nature is entrails and stomachs of animals, cleaned and boiled. The work is unpleasant, and there is the same danger of ptomaine poisoning in summer as with all fresh-meat foods. Horse, cattle, or sheep meat may be used, but the fowls never attain to the same rosiness and high condition as on the before-mentioned. These may be given fresh, best passed through a mincing-machine or boiled. Excess of the former soon sickens them, and of the latter gives diarrhœa.

Various animal meals are made for poultry foods, some from the blood at the great abattoirs, others from the meat-extract works. It is evident that most of the nutritious juices from the latter go into the bottles.

Tallow chandlers' greaves are ground and sold for this purpose. They contain too high a percentage of fat, and have the further objection that the meat is often decomposed before it goes into the coppers. It must be clearly understood that fowls are much

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better for a little of any of these foods than when fed solely upon grain, but it is best to point out the dangers attendant on their use. When the unpleasant work connected with fresh-meat foods and the irregularity of supply are considered, the advantages no doubt lie with fish and meat meals. The price of these often acts as a deterrent, but the poultry keeper should remember that these are the chief source of albuminoids, and that it is these which largely influence egg production. Thus, a good fish meal is about double the price of wheat, but contains about five times the albuminoids.

The question of cost of foods must always be of paramount importance. Proprietary cereal meals are always too dear, and the poultry keeper should buy the bulk of his food, such as sharps, wheat, oats, from the farmer and corn merchant. All he requires then is the animal or fish food to narrow the ration so as to make it suitable for the purpose. The best grain is always the cheapest. No damp, mouldy, or heated corn should be given. New grain that has been thrashed straight from the field and which has not been through the stack will throw fowls out of condition. Maize should always be used sparingly, but there is no time when dry old maize is of greater service than in autumn to mix with new English grain. Poultry mixtures as sold by most corn merchants contain the wrong ingredients, and are usually of very inferior quality. Some advocate giving all food in a dry state, and some a proportion of it in a soft crumbly mass. The very best of results have been obtained in both ways. It does not seem to matter much how and when food is given so that it is of the right kind. Young stock undoubtedly grows the fastest on part soft food, but for egg production there is not much in it. An average of 247 eggs per bird has been obtained in the past year from a pen of Anconas in confinement fed on 1 part fish meal, 1 part biscuit scrap, 3 parts sharps for the soft food, wheat and oats for grain. One of the most successful egg farmers in this country uses wheat as the staple grain, with broad-flake bran and granulated fish meal given dry in hoppers. Some who use soft food make a great point of giving it at morning or evening, but it does not seem to matter which. Theory points to giving it in morning, as after a long winter's night the birds' needs are greater, and it would be more quickly assimilated than grain.

When fowls are running at liberty in a grass field the treatment in winter should be the same as for those in confinement. Warm, soft food in the morning, grain in the afternoon, full allowance of animal food, and variety of green food or clover

meal in mash. In summer, April to September, they will do on one feed of grain daily, best given about midday. When eggs are at cheapest it often pays to put the hens on to short allowance so as to force them to eat more grass. They cease to produce and get into better condition for an early moult. When feeding grain on pastures it should always be scattered on a clean place at some distance from the house, taking a fresh place every day. It should be thrown into the rough, coarse patches of grass. The fowls will take exercise in finding it, and will scratch up the coarse grass and moss, and do much towards improving the pastures. Horses for choice always graze near a poultry house. The manurial value of fowls has not been sufficiently considered. When fed on the broadcast system, on a different portion of the field each day, the improvement of the herbage is very marked.

When fowls are kept only at the farm homestead, they should never be fed on the same tainted spot in the yards or stackyards, but should be called and fed in an adjoining field, getting them farther away each day. In winter, rowans (cavings) should be spread in a shed, or under the carts in the cart shed, and the grain thrown into it. This will keep the fowls busy in the dry for hours, and will materially enhance the supply of winter eggs. Soft food should be given, so warm that the hand can be borne in the mass. Only so much water should be used as will moisten the whole, leaving the mass as stiff and crumbly as possible. For birds in close confinement it is best to have wooden troughs for the soft food and straw, into which the grain can be scattered. A pure and sufficient water supply is essential under all circumstances.

The quantity of food to be given depends upon the breed, conditions under which they are kept, whether hens are laying or resting—therefore there is no rule. As has been pointed out, if the right kinds are given no harm will result from allowing the hens all they will eat. It will be found that they will eat from $2\frac{1}{2}$ to 4 oz. of dry corn, meal, &c., in addition to green food. The good poultryman feeds by instinct, and varies according to circumstances. The cost per hen is usually about $1\frac{1}{2}d.$ per week. As with all stock, the profit is obtained from the food given over and above that merely required for bodily maintenance; the most successful being always the best feeders. Grit, though not strictly a food, is of equal importance. Flint and oyster shell are the best, but granite screenings and fine rounded gravel will largely take the place of flint.

FATTENING

This is an art which takes years to learn. Even in the Sussex district really expert fatters are scarce. The fatting, as there practised, improves the quality of the flesh rather than adds to the weight, although both are done to some extent, this depending upon the breed, age, and condition of the chickens when put up.

It is doubtful whether it pays the average farmer to attempt to trough feed and use the cramming machine. If the chickens are reared according to the directions given in this work, they are fit to kill straight off the runs. Such birds as Faverolles and Sussex crosses will be quite fat at sixteen weeks old. So also will Indian Game crosses, although slower in growth; but Orpingtons will be comparatively raw, and will need fattening. There is no better way for the farmer than to put the cockerels in lots of a dozen or so in a wired pen on grass, feed them with crumbly soft food twice daily, and allow a feed-hopper, or box of wheat, in the house for them to help themselves at. To the dietary given elsewhere for laying stock there should be added barley meal, maize or maize meal, and, if easily obtainable, milk. On this diet they will be quite fat enough for any market in a fortnight. As soon as they cease to eat eagerly they should go, as they sink quickly again. The profit on fatting poultry by the crammer is made partly by buying and selling with great judgment, and partly by securing the enhanced price which such delicate-fleshed birds are worth, but rarely make outside the London market, unless one has a private trade with good-class houses. For this industry rows of cages are required, best under a shed, although many are fatted in the open. These cages are set, resting on uprights, about a yard from the ground. Out of doors the top is covered so as to be waterproof. Under a shed, about 4 yd. wide, the cages can be in rows on either side with a gangway between. The cages are 16 in. wide, made of wooden bars—top, bottom, and front—but best divided by boarding from the next pens. The slats at the bottom are about 1 in. wide and as far apart. The birds thus always perch, and the droppings fall to the ground. In front of the cages a V-shaped trough is slung by wires at a convenient height for the birds to peck at. The front slats have to be wide enough apart for the birds to get their heads through. About 6 in. of frontage is allowed to each bird, and cages are best 2 ft. to 2 ft. 6 in. wide, so as to hold four to five birds. For the London trade chickens can scarcely be too large, and those of 4 to 5 lb. when put in are most suitable. For the private house trade those 3 lb. are better. Chickens under 2½ lb.



Photo. Sport and General

INDIAN RUNNER DRAKE

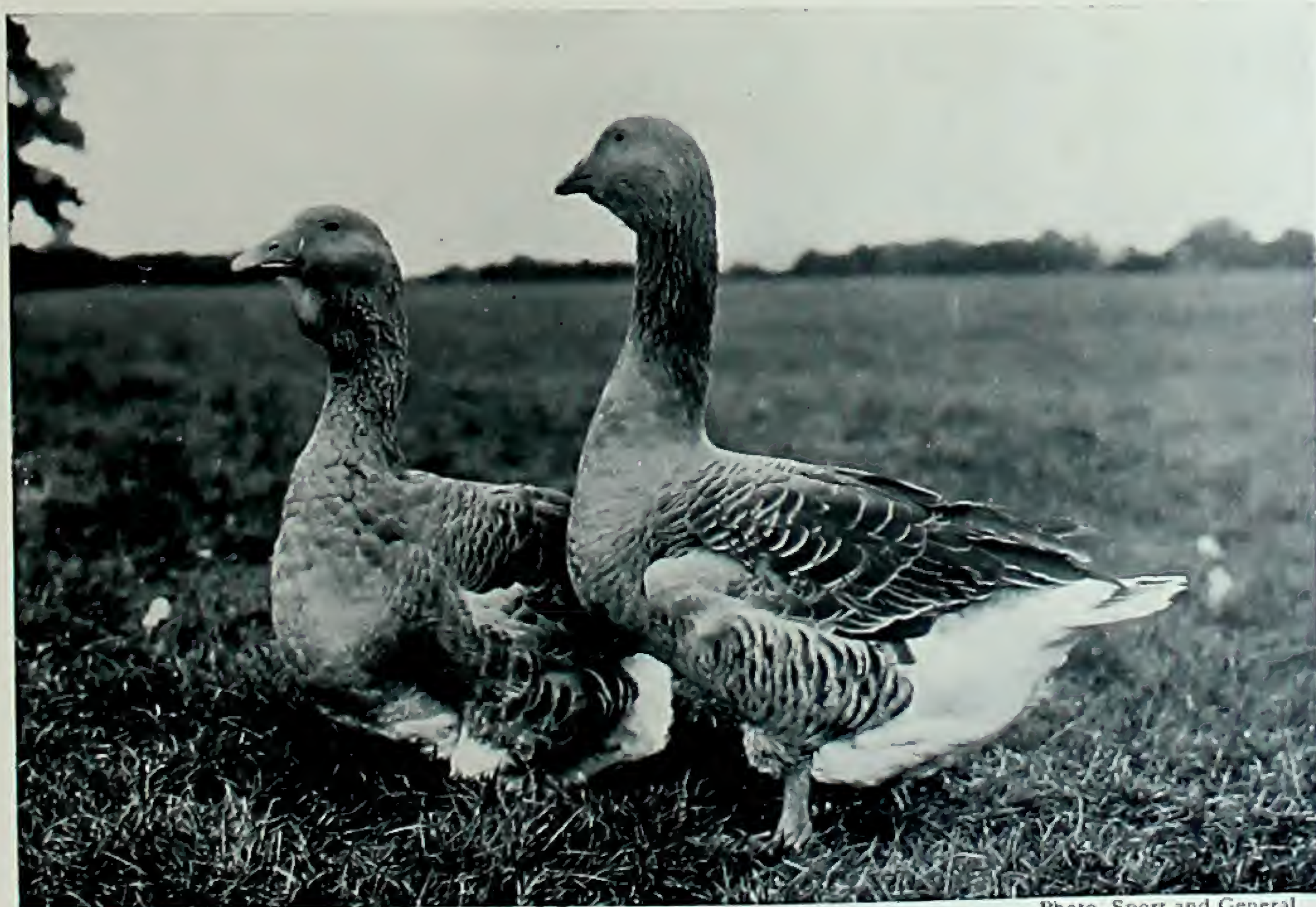


Photo. Sport and General

TOULOUSE GEESE



Photo. Sport and General

EMBDEN GEESE

will scarcely fatten at all, but in April and May the professional fatters often have to take such, others being scarce. The stronger the chickens the thicker food they will take, but all should have rather thin food for the first three days. The capacity of the crop is increased by careful treatment. When put into the cages the chickens should have no food for the first day. On the second and third days they should only be allowed to fill the crop a quarter full; on the fourth and fifth half full; on the sixth and seventh three-quarters full, and on the eighth they may have the crops filled. This will last until the thirteenth to sixteenth day when they must go on the crammer. Again the crop should not be filled for the first day. About a week on the crammer does all that can be done. When trough-feeding, the attendant goes round with a bucket of soft food and a small wooden spade with which he scrapes a modicum of the food into the trough. The birds should be allowed to nearly clean this up, but not to tire themselves by pecking at the last fragment. Then another lot is given in the same way. The attendant may put his fingers through the bars and feel of the crops so as to know when each lot has had enough. If a bird is off feed, or does not empty its crop owing to indigestion, the crop is washed out with water, then two tablespoonfuls of sour milk are given, and he is fasted for one meal. If he then does not digest the food he is turned back to a grass run again. Only a practical lesson can teach how to hold a bird, put the rubber tube down its throat, and force a sufficient quantity of food down to the crop.

The first food consists of sour milk, 1 part; water, 2 parts; 4 parts of ground oats to 1 part of sharps. The food is mixed to such a consistency that a stick will almost stand upright in it. After the eighth day 1 lb. of melted animal fat may be given to 3 gall. of meal. As the birds advance and will bear it, the food is thickened by adding more meal. If a bird goes sick on the crammer he is best drafted for killing. These are the usual methods of the professional fatter, but there are no hard-and-fast rules. A well-known fatter in a nobleman's poultry-yard wins with dressed birds at the large shows, which are fed on a greater variety of meals, including wheat, barley, oats, and maize ground up together. It is not an art easily learned, and a novice would probably bring the birds out of the cages worth less than when they went in. Anyone going in for poultry fattening must go, as the writer has done, to a fattening establishment to acquire the necessary skill before starting operations on his own account.



CHAPTER VII

PROFITABLE POULTRY FARMING

By J. W. HURST

Whatever doubt may still exist regarding the profitability of poultry farming as a separate undertaking or a sole means of livelihood, it cannot be gainsaid that the production of table poultry and eggs is remunerative when carried on in conjunction with the other uses to which the land is put by farmers and smallholders. It would not be difficult to show where and how poultry breeders who are obliged to hire land for the express purpose, and to buy all the food used, are able to make a profit. It consequently follows that when there is no additional rent to pay, and when a large proportion of the food costs nothing or is produced cheaply, the net returns must be greater than under other conditions. Farmers and smallholders are in this favourable position, and are better able than any others to make the maximum profit with the minimum outlay or risk. As a matter of fact, the bulk of marketable supplies at present available represents the output of agriculturists—farmers, smallholders, and cottagers—the contribution of so-called poultry farmers being quite insignificant by comparison. Nevertheless, the supplies fall far short of the demand, as regards both quantity and quality, and considerable opportunities exist for those who will modernize their methods of production and marketing, giving as careful attention to this as to any other branch of their work. In any case it should at once be understood that profitable poultry and egg production also involves farming of some description, and that, even if the poultry department be regarded as the most important section of the work, the land sufficient for the purpose must be utilized for cultivation or pasturage, and that the fowls need the support of other stock, or form of farming, to bring the venture to a successful issue. The great majority will find it much more advantageous to limit their poultry operations than to attempt the maximum that may be encouraged by possibilities of space. Under the average conditions prevalent in the United Kingdom the back-

bone of the industry must consist chiefly of those whose output is duly proportionate to their other and complementary rural occupations. The general experience suggests very plainly that the circumstances do not favour the establishment of large poultry-farming plants, and according to reliable reports the big American concerns of which so much has been written do not, in their results, justify imitation. The future of poultry farming in this country rests with those farmers and smallholders who, with a proper sense of proportion, regard it as a branch development of their general agricultural work. Any attempt to give it great prominence is, for the majority, ill-advised.

There is, however, on the other hand, every reason for the improvement of methods and the promotion of development within common-sense limits. To make the most of poultry production not only must the breed kept be one that is characteristically suited to the situation and the object in view, but the strain must be built up for the purpose; the housing arrangements must be the best possible, and the feeding must be good but economical. These subjects are all dealt with in detail in other sections under their separate headings, but it is necessary here to insist upon the improvement of older methods of management as essential to profitable production, whether for market or home consumption. In the latter connection it should be noted that many farmers and smallholders overlook the possibilities of their opportunities. It is so common to consider questions of production in relation to marketing only that the economy of home production for home consumption is often overlooked. The greater economy does not, of course, always lie on this side, but in some circumstances it does, whilst in others it is obvious that distance from market or lack of facilities for cheap and rapid transit make the marketing of such produce as eggs and poultry quite unprofitable. Consequently there are very many cases in which the producer's own requirements constitute the only outlet for his produce, but it is quite as necessary for him to produce the maximum of quality and quantity at the minimum of cost as it is when the market is the objective.

Before embarking upon poultry-farming enterprises of any description, and for any of the several possible objects, it is before all things desirable to carefully consider the limits of profitable production. That the productiveness of fowls has been remarkably increased under some of the conditions of domestication is a commonplace; but that there should be, in individual circumstances, a limit to increased production is only realized by the practical producer, and that profitable production is subject to an

even stricter limitation is a hard lesson for the inexperienced or careless. Stock breeders and dairymen have very generally learnt that meat and milk may be produced at a cost which is disproportionate to the return, but poultry keepers fail to understand that there is a point beyond which it is unprofitable to force or even attempt production. This is not only demonstrable in the matter of egg production, but it is also true—although not always so superficially apparent—that the production of table poultry is not by any means necessarily profitable, even when the birds are successfully raised and marketed. This class of stock is too frequently considered unworthy the trouble of accurate account-keeping, and that a reasonable proportion mature and realize good or fair average prices is accepted as sufficiently satisfactory proof of the financial success of this by-product of the farm. There are others who know that a branch of their production shows an insufficient margin of profit, but are inclined to lay the blame upon competition, considerations of demand, or the delinquencies of salesmen, rather than to excessive cost of production or to rearing under conditions unsuitable for a particular class of stock.

Insufficiency of space, unsuitability of soil, remoteness of situation, or an unfavourable aspect must all be regarded as legitimate limitations to profitable production; and the selection and relative cost of foodstuffs are stumbling-blocks for the unwary. The cost of production as regards food, which is its chief item, usually receives inadequate consideration; and there is a general failure to duly weigh suitability of quality and constituents against the price. The Ultima Thule is reached when cheapness is synonymous with inadequacy of quality or constituents for the object of the production, or when dearness is incompatible with final marketable value. It consequently follows that in such a production as that of turkeys, for example, where the period of rearing and preparation is unusually long, the use of inferior foods will not serve to maintain condition from start to finish, but the cost of production will be disproportionate without some adequate relief as regards purchased foods. The suitability of the range and its extent must, therefore, be looked to for its supplemental supply of natural food, and the reduction of purchased foodstuffs further aided by the feeding as far as possible of home-grown products. A rapid production, such as that of ducklings or table chickens, necessitates the use of a certain class of food, the assimilation of which hastens a marketable maturity, and a higher cost is in consequence justifiable in proportion to the shortening of the period, and in relation to seasonable production. Among the other factors of production,

by which it is limitable, the poultry rearer has also to reckon with certain trading expenses, which are in some instances sufficient of themselves to kill profit, despite the fact that the prime cost may have been kept within reasonable bounds. This by way of a general preliminary warning, the possibilities of poultry farming being much more commonly proclaimed and accepted than the less apparent limitations. Egg and poultry production has been much more seriously considered since the increase in the number of small holdings has directed greater attention to the smaller branches of agriculture, and it may be anticipated that poultry farming will be a more or less important factor in their successful development. Nevertheless, in the majority of cases it would be unwise to assume that poultry may legitimately occupy a relatively much more prominent position on small holdings than it is capable of occupying in the general production of the farmer proper. It may, however, very well be made of greater economic value, on both farms and small holdings, by a more widespread adoption of improved methods, and especially by the more particular selection of stock in relation to demand and conditions. If the creation of small holdings were adequately supported by local co-operation and a scheme of organization the prospects would be greatly improved for competent individual holders.

EGG PRODUCTION

Egg production is the branch of the industry that has received by far the greatest amount of attention and encouragement. It has been very materially assisted and developed by the long series of laying competitions inaugurated by the Utility Poultry Club, and great efforts have been made by the National Poultry Organization Society to combine egg producers for marketing purposes. The value of selection for increased prolificness, and the greater importance of strain than breed have been taught by the former, whilst the extent of the demand and the necessity for quality and methodical handling have been preached and demonstrated by the latter. Nevertheless, in view of the possibilities, we are only at the beginning of the business; the levelling-up of farm flocks has yet to be accomplished, and the co-operative handling of the produce is still in its infancy.

The scientific aspect of the inheritance of fecundity is still in the debatable stage, but recent investigations appear to have established the fact that the building up of a laying strain of highly-prolific fowls depends very largely upon the selection of the cocks as well

as of the hens. This fact has also been recognized by some of the most successful practical specialists, and the successive laying tests in this and other countries have enabled them to demonstrate something of the laying powers of carefully-selected and mated strains—the previously unsuspected capabilities of the domestic hen as an egg producer being the most notable feature of the modern development of utility poultry keeping. The making and maintenance of such highly-productive strains as have been built up by some of the specialist breeders is, however, outside the scope of work best suited to the circumstances of the average farmer or smallholder. The methods involved are too exacting to be adopted in their entirety by those who are working under farm conditions, but who should nevertheless exercise a sufficient and persistent selection to raise the productive level of their flocks. This may be done with a considerable measure of success by careful observation of the habits and characteristics of the birds, but the more exact knowledge that results from the use of trap-nests is only gained at an expense of time and labour that is not justified in ordinary circumstances. In selecting it is important to remember the relative value of eggs laid in winter and at other seasons, the difference being so considerable that good winter layers may be more profitable than birds which may give a bigger annual yield, laying the bulk of their eggs during the warmer months.

The extent to which egg production may be developed as a profitable side line by the farmer or smallholder must depend mainly upon the circumstances of the individual, the most profitable outlet being a private connection, where this is readily obtainable. As in many other cases of attempted direct dealings between producer and consumer there is likely to be some difficulty in regard to continuity of supplies, and it should be among the aims of selection and management to equalize the output in some approximation to the demand. This may be accomplished to some extent by keeping fowls of both the so-called “laying” and “general-purpose” types, the general tendency of the former being to produce the greater proportion of their eggs in spring and summer, and of the latter to be more amenable to encouraging treatment in autumn and winter. These tendencies and characteristics are, however, subject to modifications under selection; hatching date, feeding, and general management are important influencing factors.

A breed is suitable or not as raw material for the given purpose of egg production, but it is the family or strain of the chosen breed, selected and built up of the most prolific and constitutionally fit, that the producer must look to as most likely to meet his needs

and give him his necessary margin of profit. The novice in this branch of production may commence at the beginning and make his own strain, or he may acquire the strain of another, but he must have strain as well as breed.

Under the prevailing conditions of poultry keeping, and in view of the extremes to which breeding operations have been pushed, the beginner would be well advised to secure as his initial stock, birds that are fair average specimens of their class. There are those who judge the quality solely by the price, but for the novice the hen of average or moderate value and qualities is undoubtedly the best bird in most cases. To obtain the hen of average worth—in every sense—at the commencement is to secure the best material for strain making. Experience teaches how far a strain may be raised above the mean without endangering its proportionate profitability. It is necessary to remember always that there is no room in a flock of layers for drones; they consume the profit made by the workers. Commencing with an average flock, the general level of production must be raised in succeeding generations to a point that is consistent with the maintenance of a sound constitutional vigour. To define that point on paper is impossible, the individual poultry keeper being the best judge of the health and profitable condition of his own stock. If the most prolific bird of the year is deficient in the qualities essential to the production of sound progeny, her record must be sacrificed unhesitatingly to the fixed policy of maintaining strain through the physically fit only. When production reaches that point at which it imposes an undue strain upon the stamina of the bird it ceases to be profitable, and any attempt at perpetuation inevitably results in degeneracy. The lesson of experience appears to be that, as a rule, selection is productive of the greatest improvement in egg yield during the first few years, and that any very material subsequent advance tends to be much more gradual, and is accompanied by increasing risks.

The reliability and practical utility of estimates of cost of production and probable profit must always be more or less questionable, as the unavoidable consequence of the many and widely differing influencing factors; so that it is extremely difficult to give satisfying answers to questions relating to the cost of poultry feeding, and the safe limits of anticipation regarding egg yield and profit per hen. Nevertheless, these questions continually arise, and it is perhaps desirable to endeavour to arrive at a workable basis, such as has been found to approximate to accuracy in average circumstances. In connection with the food question there are some interesting figures in a report of experiments at Theale, by

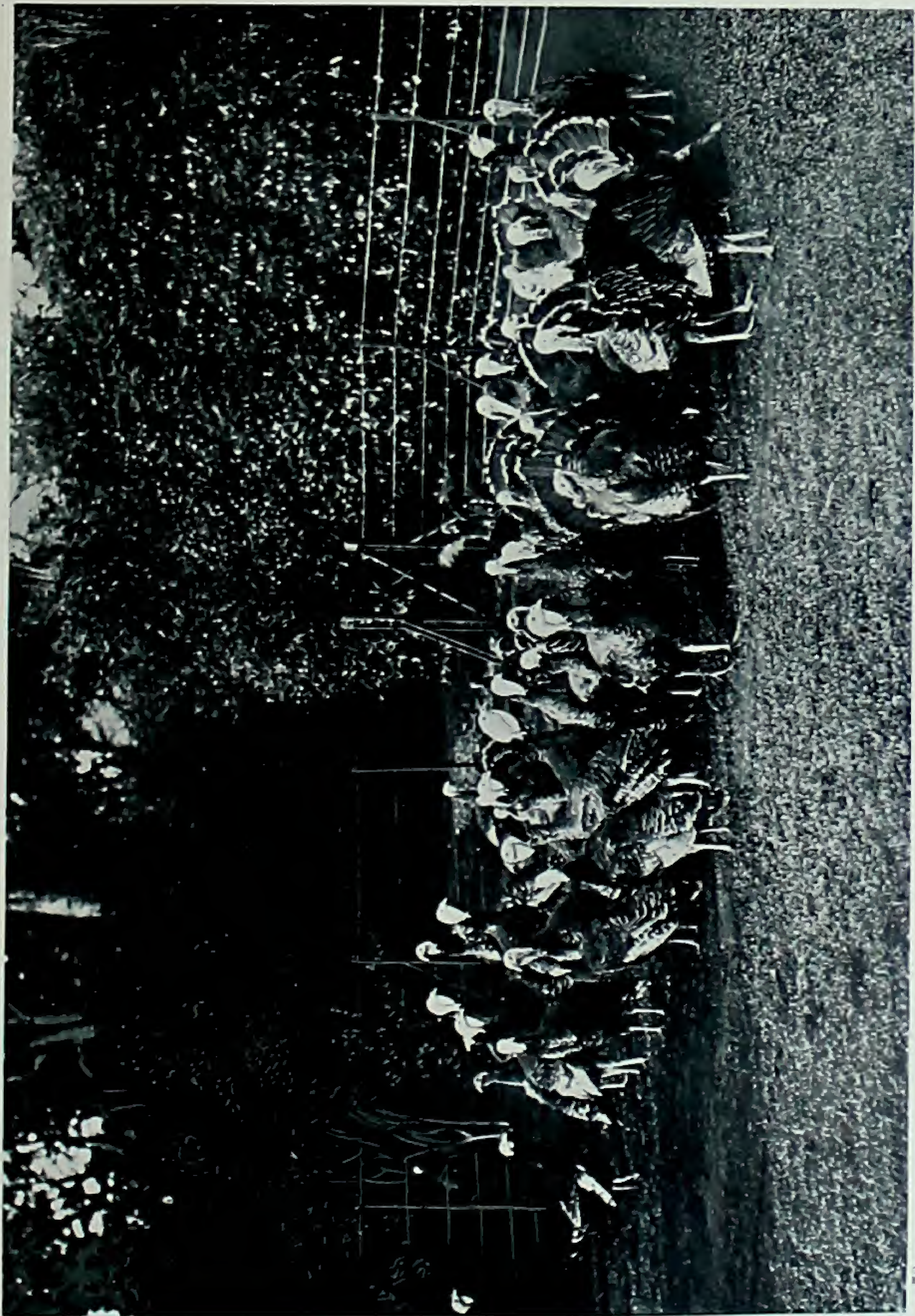


Photo. Sport and General

AMERICAN BRONZE TURKEYS

Handwritten marks in the top left corner, including a large 'J' and a small 'r'.

which it was found that birds in runs can be fed at a cost not exceeding 4s. 10d. each per annum, and the obvious conclusion is drawn that with a free range over good ground the cost would be less. Fowls in runs of any extent may very possibly be required to bear a rent charge, from which the free-running farmer's birds are exempt, and it may or may not be necessary to add something for the cost of labour. Allowing that there is in some circumstances no necessity to make a charge on either of these counts, there still remains the cost of housing, to say nothing of that of the birds, and without reckoning interest on capital, &c. If the margin beyond the food cost is not enough to cover these other items there can be no profit. The actual cost of food as given is, however, useful in its approximate confirmation of the common estimate of one penny per week, with which other experiments and practical experience in general more or less agree. It should cost very little more in any ordinary conditions of confinement, and may be very much less in some circumstances of freedom, but as a working basis the penny estimate appears to be sound.

Under the ordinary conditions of poultry keeping on farms, rent and labour are practically unknown quantities, or are regarded as unconsidered trifles, whilst in most cases the rent at least is counterbalanced by the value of the manure. In the event of a sufficient head of stock being run to necessitate the employment of labour, it becomes a simple question of dividing the wages by the number of fowls—but such extensive production on the part of agriculturists is exceptional. The majority must, however, reckon something for housing, which may be sufficiently arrived at by estimating the probable "life" of the house, spreading the initial and maintenance cost over the given number of years and dividing it yearly between the birds accommodated. There then remains the cost of the birds, which will vary considerably according as they are bought at maturity or home-reared; but in either case about 2s. each must be deducted as their ultimate marketable or stewing value as old hens, and the balance apportioned equally to the years of egg production.

All these items are of trifling importance to the keeper of a few fowls, but they are among those things that are often neglected in the estimates of any contemplated increase of production, built upon the more or less misleading basis of what has been achieved with a few fowls fed chiefly upon waste food. The aggregation of such apparently trifling items assumes an unexpected importance in the larger results, and even then the estimates will be incomplete, from the point of view of accountancy, although near enough to accuracy

for the general purpose of the farm or other average poultry keeper.

Broadly speaking, the average annual cost per hen, although subject to slight variation, will be about the same whether the individual birds produce many or few eggs. By the exercise of ordinary systematic care in selection, a flock of layers may reasonably be expected to yield an average of from 120 to 150 eggs apiece and upwards per annum during their first two seasons, and if they do not fall below the minimum they should be reasonably profitable.

EGG PRESERVATION

The inequality of supply and demand at the different seasons of production necessitates the preservation of such perishable produce in times of plenty for unloading in times of scarcity. The season of preservation is dominated by the factors of increased productiveness and the weather influence, and these have combined to make it usual to put down the bulk of the surplus eggs in March, April, May, and June. During those months eggs are generally very plentiful and prices low, whilst for the most part the heat is seldom sufficient to affect the keeping properties of the produce. Recent scientific research shows that the bacteria causing decomposition is present in greater numbers during July, August, and September. The bulletin of the Storrs Agricultural Experiment Station, which deals with this matter, states that April eggs have the best keeping quality, those of May and June following in the order of the months. It should be noted that with the Danish egg preservers (who preserve about a quarter of their total exports) April is the most important month.

Eggs, to be suitable for preservation, must be produced by healthy stock, must be clean, frequently collected, and preferably infertile. The place in which the eggs are preserved must be capable of being maintained at some approximation to an ideal temperature, the limits suggested by the Board of Agriculture being from 33° to 45° F. For the accommodation of such large numbers as are dealt with by commercial or co-operative undertakings some special provision is required, such as the construction of basement or cellar tanks, but for the smaller needs of farmers, smallholders, and others, barrels, vats, or earthenware pans and crocks are suitable.

Lime water is largely used where eggs are preserved in considerable quantities, otherwise the introduction of water-glass (silicate of soda) as a medium has resulted in the practical abandon-

ment of more-limited older methods, and the use of this has led to a considerable extension of the practice of "pickling". If it is realized that the bulk of the English eggs that reach the markets are the aggregate of the comparatively very small quantities individually produced by farmers and smallholders, it will be evident that such producers have in most cases too insignificant a surplus to necessitate or justify very elaborate attempts at preservation; and even where the output is large enough for treatment upon a more extensive basis, or upon a co-operative plan, the risks of market should be seriously considered before making any great outlay upon plant. There are, however, many circumstances in which producers might undertake the preservation of eggs with some advantage, and it has been stated by one who has had considerable experience in this country, that it pays to preserve eggs that do not exceed 8*d.* per dozen in value.

Of the many vexed questions affecting poultry and egg production and profitable marketing, one of the most important concerns the equalizing of supplies and the avoidance of sales at unremunerative prices, and in perhaps the majority of seasons egg preservation is justified by results. Inasmuch, however, as the variable character of the seasons tends to produce considerable fluctuations in some years as compared with others as regards the output of new-laid eggs, it is wise to limit the preserving operations—remembering that preserved eggs represent capital that is locked up for several months. Eggs may be preserved commercially to the best advantage in cases where there is a reasonably assured local outlet for such produce, but it is generally very risky to put down any considerable quantity with a view to marketing in London, or in such a provincial centre of distribution as, say, Manchester, or any of the districts served by the ports receiving large foreign supplies.

The efficacy of water-glass as a preservative has been severely tested in experiments conducted by the Aberdeen and North of Scotland College of Agriculture. The longest average time during which it is economically advantageous to preserve eggs is about six months, and the Scottish tests proved not only that eggs kept in water-glass for any period up to a year can hardly be distinguished in taste or smell, either raw or cooked, from ordinary fresh eggs, but that the chemical composition remains practically unchanged. It is reasonably shown by tables of analyses that there is no important alteration in the composition of eggs preserved for any period up to a year, and half that time is sufficient for the economic purpose. The chief change is in the composition of the shell, in which the percentage of silica is increased, one result of which

is that, unless the shell is pricked before boiling, the egg will probably burst. For this and other reasons preserved eggs should always be sold as such, and not as new-laid.

Water-glass is not an expensive substance, and as the necessary percentage in solution is small, the cost of preserving is consequently trifling compared with the increased winter value of eggs thus held over from the spring. The manner of using it, whether in dealing with large quantities for sale or small lots for private consumption, is simple in the extreme, merely consisting in the immersion of the eggs in a 4- or 5-per-cent solution of water-glass—many users find a 3-per-cent solution quite satisfactory. But a stronger solution than 5 per cent is quite unnecessary and undesirable, inasmuch as it is liable to impart an objectionable flavour to the eggs. The concentrated solution, in which form water-glass is usually sold, should be diluted to the required proportion by the addition of pure boiling water, but must, of course, be allowed to get quite cold before use.

The great bulk of preserved foreign eggs are kept in lime water, and although this method tends to roughen and harden the shell, it is more extensively used commercially on account of cheapness—an important consideration in dealing with grades of lower value. The lime pickle now generally employed, and recommended by the Board of Agriculture, is composed of four parts of finely-slaked lime mixed with twenty parts of cold water, with the subsequent addition of one part of salt. The lime and water should be mixed about a week before the eggs are put in, well stirred daily, and the salt added on the fifth day. At the end of the week the clear solution is poured off the lime sediment, and is then ready for use. Generally speaking, lime water is used for large quantities and for cheap-grade eggs, but for small quantities or for eggs of first quality the use of water-glass is often preferable.

The preservation of eggs by cold storage is extensively employed in the United States of America, but the results do not appear to have been as satisfactory as was anticipated, and in any case the method is not suited to the circumstances of the general producer. There are also many other methods in use, but for the practical purposes of British producers there is no need to consider more than the employment of lime water or water-glass as simple and satisfactory media. The cost of preserving eggs in water-glass is estimated to be about one-eighth of a penny per dozen.

TABLE POULTRY

That the possibilities in this branch of production are considerable cannot be gainsaid, although they have not as yet been as fully realized or accurately estimated as in the case of egg production. Satisfactory information regarding the costs of production and the average rate of growth is somewhat meagre and conflicting, but in one section of the work—that of fattening—the Sussex chicken industry is a standing example of success. That rearing may also be made satisfactorily remunerative is equally certain, although the evidence is not always so plainly apparent. Reliable data is, however, being accumulated as the result of experimental work conducted under the direction of the Board of Agriculture, from which it should be possible to gauge approximately the cost per pound of chicken flesh produced under the conditions that obtain on farms and small holdings.

It is at any rate a matter of experience that the production of table poultry of different descriptions is profitable where the conditions are favourable, and it is an undoubted fact that there is ample opportunity for largely increasing the output without endangering a reasonable margin of profit. But that the conditions are not equally favourable in all parts of the country should need no insistence, and that they are less generally so than in the case of eggs is obvious.

Before British table poultry can occupy and maintain its rightful position in our markets a considerable amount of improvement is necessary, success depending upon the proper selection of breeds, calculated to produce the best growth and weight in the shortest time, and the skilful management of the breeding stock and proper feeding of the young birds during the rearing and fattening periods. It is, moreover, essential that the majority of producers should be taught how to give the best marketable appearance to the finished product. Carelessness in preparation for market, and ignorance of the most desirable methods, are the cause of a very considerable annual loss to English producers.

There is, further, a very general want of appreciation of the importance of producing the various descriptions in one season, supplies being irregular and more often than not disproportionate to the demand.

The cost of production is very often made unnecessarily excessive by the use of unsuitable feeding stuffs, and the feeding period is unduly prolonged by the employment of cheap food. In the majority of cases the individual producer is handicapped by the

smallness or irregularity of his output, the difficulties of transit, and the cost of carriage. The remedy for the common disabilities does not appear to lie in the direction of a largely increased output, even with the benefits that result from greater skill and experience, but the future of the industry depends rather upon the grouping of producers in their several districts, provided the localities are generally suitable and the markets easily accessible.

CHICKENS

The trade in table chickens is continuous, and rearing should be practically an all-the-year-round occupation in which very many more might profitably engage than at present contemplate such continuity in their operations. The limiting of rearing to the months that are most favourable to natural growth and development is usually made to serve, as far as may be, for a demand which is necessarily largely met by the supply of birds long past their best marketable age and condition. Such a method is neither satisfactory to the consumer nor sufficiently profitable for the producer. Making due allowance for more or less unexpected fluctuations, market values rise and fall with some approximation to seasonable regularity. In order to realize the best prices of the year, it is as necessary to produce winter chickens as it is to produce winter eggs. It is as necessary to market birds that really are chickens as it is to market new-laid eggs, otherwise the enhanced value that attaches to quality and condition is not sufficient to raise the average of the annual returns.

The holding over for the spring demand of birds hatched in the autumn is in a way comparable to the holding over of eggs for a rise in price, but it is a method that can never be as satisfactory or profitable as the more immediate production for the season of demand. It is not always an easy production, but it is less difficult than some suppose. Poultry keepers have very largely modified their opinions about the production of winter eggs during recent years, and there is every reason to suppose that winter chicken raising is capable of extension when the subject is given equal practical attention. Efforts in this direction have tended rather to the employment of artificial methods in an extreme degree, with some consequent disappointment and hindrance to progress. There is, however, a safe and proper use of mechanical appliances, and the limitations as well as the possibilities of artificial methods require to be better understood. It may in any case be noted that the rearers of the south-eastern counties of England, with whom

winter chicken rearing—although inadequate to the needs—is a matter of ordinary routine, rely almost exclusively upon natural methods.

In profitable table-chicken production the general aim is the attainment of a suitable killing condition within a relatively short period. The birds must be ready for fattening when from three to four months old, according to the time of the year and the character of the season, and the attainment of the desired result involves the use of suitable breeds and foods.

The excessively large birds that are so frequently seen at the big shows providing dead poultry classes—such as the Dairy and the Smithfield Club Shows—are not economical for market purposes, the most profitable product being the bird of medium size and weight. The excessively heavy specimens that gain the prizes at these shows are interesting as examples of the fatteners' skill, rather than of a production that is likely to meet more than a very limited market demand. In this connection it should be noted that there is some difference of opinion regarding the relative economy of producing fully-fattened or half-fattened fowls for market. As a matter of fact there is a much wider market for the latter than for the former; but in the London markets, where the chief demand exists for chickens that have been machine-crammed as well as trough-fed, the supplies are generally sold at rates that justify and encourage the completion of the fattening process. Of the provincial demand generally it may be said that the half-fattened (or trough-fed) product is more favourably received, as it is for a considerable proportion of the metropolitan requirement.

Fattening that includes cramming is, indeed, a highly specialized branch of the industry, and cannot in existing circumstances be commended to the attention of the majority of chicken producers. For the average farmer or smallholder good feeding throughout rearing, with a final period of trough feeding in confinement, is usually the most desirable and profitable mode of preparing chickens for market. The proposed establishment of fattening centres is a proposition the carrying out of which upon an organized co-operative basis may eventually solve many existing difficulties, although there are several obstacles to the successful materialization of such a scheme. A fattening station cannot be successfully conducted unless adequately supplied with suitable birds and feeding stuffs readily available in the neighbourhood, and unless conducted under highly efficient management. It would appear that the success of such a scheme must largely depend upon its gradual and judicious introduction, both on account of the limitations of supply

(as regards lean chickens) on the one hand and of the provincial demand (for fully-fattened fowls) on the other. Small beginnings would be capable of, and tend to, gradual development, but there can be no forcing; consumers would no doubt in time increase the demand, as they realized the greater economy of fattened birds, and the requirements of the fattening centres would equally induce increased local rearing. But the interests of both branches of production — rearing and fattening — must be safeguarded by an organized co-operation.

Whilst the demand for fully-fattened fowls is limited at present, that for capons is very much more restricted, and is for the most part sufficiently met by extra-large fattened fowls, viz. birds that are more thoroughly grown and developed before fattening than the chickens used for ordinary table requirements. The comparatively few capons (that really are capons) that are marketed in this country are nearly all produced for the Christmas trade.

Attempts are frequently made to interest producers in *petits poussins* or *poulets au lait*, or "milk chickens"; birds of from a month to two months old, and weighing from 8 to 12 oz. The trade in these small birds is, however, very limited, and it is a moot point as to whether it would grow or not with increasing supplies. Such lines of production are outside the scope of the ordinary farmer or smallholder, whose best and safest course is in the rearing and half-fattening of medium-sized chickens, the demand for which is more considerable and widespread than for any other class of table poultry.

DUCKS

It is the production of young birds that is chiefly required, of ducklings to meet the demand between February and June, rather than of ducks for the later trade. A quick turnover is one of the most important considerations, to which due weight must be given in any attempt to develop the poultry industry. The raising of turkeys is a long-period affair, but inasmuch as it is only suitably and profitably engaged in by occupiers of a considerable acreage (who are presumably men of more substance than smallholders), this factor is of less importance than in the case of the large majority of poultry producers. It is to the small producers that the consumers must look for the bulk of our home-grown poultry. Quick-growing chickens and quick-growing ducklings are consequently among the minor products that may be made extremely useful to small agriculturists, on account of the quick turnover and the frequency of the monetary returns. It is very

unlikely that the demand for older birds will go unsatisfied, and the small producer should be primarily interested in the duckling production, which may be successfully undertaken in circumstances and under conditions that make it possible for many who have insufficient accommodation for birds of other descriptions. The methods that have for so long been associated with the Vale of Aylesbury, the home of this special production, are largely adaptable elsewhere; and the same district has given us the breed that is most suitable on account of its economic qualities, of which quick growth is not the least.

The "duckers" of Buckinghamshire and Bedfordshire occupy a very similar position to that of the chicken-fatteners of Sussex, and the London markets still look to these specialists to supply them with their best-quality fattened ducklings and chickens respectively. Although both these localized industries have made considerable modern extension, and both have found many imitators, the original centres maintain their reputation for excellence of quality and condition, as well as for relative continuity of supply. There is, however, this difference—the chicken industry has been more progressive in and around its centre, than has been the case in the original duckling district. In the result some of the newer duckling districts have entered keenly into competition with Aylesbury, and the proportion of increase in the output has been much greater outside the home of the industry. The point of this comparison appears to be that it is comparatively easy to successfully reproduce the methods and conditions suitable for duckling production, and it is a fact that a large measure of success has been achieved in many other parts of the country, especially upon light, gravelly soils, in a manner which bears no relation to the central growth of the chicken-fattening industry.

The "duckers" process is practically one of fattening from the commencement, throughout the rearing period, and the secret of profit consists in the production of heavy marketable birds at the age of about eight or nine weeks. At the killing age the birds weigh up to about 5 lb. apiece. A feature of the local method consists in the division of the labour of production between breeders and rearers, a division which has many advantages. The most obvious benefit of this method is the fact that the stock ducks, by their wide distribution over a large number of farms, can be kept under healthier conditions and produce a higher percentage of fertile eggs and a more vigorous progeny; whereas the hatching and rearing may be conducted upon small areas, thus bringing the work within the capacity of smallholders and cottagers.

GEESE

This is a production concerning which some caution is required, having regard to the relatively limited nature of the demand, and its unequal distribution. It may, however, be regarded as a favourable circumstance that the demand for large geese has to a considerable extent given place to one for goslings during the season of their production, thus suiting the previously-noted necessity for quick returns, and supplying, within limits, the incentive for the production and marketing of young birds. The likelihood of this production becoming excessive is in some measure prevented by the fact that it can only be profitably undertaken in favourable situations, viz. where there is a sufficient grazing acreage which cannot otherwise be more profitably utilized; nevertheless, the production is sufficiently remunerative to make an increased output worth while, if the regrettably narrow limits of demand could be sufficiently extended.

Under suitable conditions small flocks of geese are as profitable stock as any other class of poultry, but inasmuch as they require a larger range than other poultry keepers usually have available they are only suitable for farmers and commoners. Farmers sometimes object to them on the supposition that other (four-legged) stock will not graze after them, but provided they are not too heavily stocked this objection is not well founded. It is also stated that they are destructive to the herbage of the pasture, against which may be set the fact that they uproot and devour the buttercup, any damage to the surrounding grass being consequent upon that meritorious act and comparatively trifling.

Commons, wastes, and forest lands have, however, from time immemorial been associated with the keeping of geese, and the remark of Gilbert White to the effect that such tracts of land are of considerable service in maintaining cottagers' geese at little or no expense, is as true now as in the eighteenth century. It may not be generally realized what the right of pasture represents to the peasant goose-breeder, but the following estimate is based upon experience. Two geese and a gander should produce at least from seventy to eighty eggs in a season, which, at a low computation, will give at least fifty marketable birds. Killed as goslings at, say, an average of 6 lb. weight each, they may be sold at from 8*d.* to 10*d.* per lb.; or if run on for heavier weights, will make up to 10*d.* to 1*s.* per lb. in September or December. In view of the fact that the cost of feeding, over and above grazing, is comparatively small,

it is obvious that a commoner's geese may become rent-payers, if no more.

In moderate supply goslings will generally find a remunerative sale, and may without undue risk be sent off the grass to London during the season, if there is no near-at-hand demand. Although there is still some special demand in September the Michaelmas goose market, as such, has practically ceased to exist, and at Christmas the demand for large fat geese is second to that for turkeys, the most profitable production for the generality of goose-breeders being that of "green" geese (or goslings off the grass) during the earlier months.

TURKEYS

That there are considerable and increasing opportunities for turkey breeders can scarcely be gainsaid; but inasmuch as a relatively large area is a chief necessity of this production, any increase in the output must depend mainly upon the farmers—in contradistinction to the smallholders—and their recognition of the facts. The long rearing period makes it essential that the range shall be suitable as regards the sufficient supply of natural food. In addition to which the nature and habits of the turkey also make a large space requisite for the maintenance of health and the progress of growth and development, as well as the production of that condition that fits the birds for the finishing process that precedes the killing date. This is consequently more particularly a farmer's production, but it unfortunately happens that a large number of agriculturists regard the turkey with disfavour—largely on account of a supposed inherent delicateness.

If turkey production is to be sufficiently increased, it will not only be necessary to show the profitableness of the undertaking, but to demonstrate the fact that where the stock is delicate it has usually become so owing to the mismanagement to which it has so commonly been subjected under domestication. It is, further, desirable to emphasize the fact that demand has tended to increase, and that there has been a considerable lengthening of the season—which was at one time almost wholly confined to Christmas-time. Another, and an important change in the character of the demand is relative to size. At one time efforts were chiefly directed towards the attainment of great size and excessive weights, the price per pound increasing in proportion to the bigness of the total; but the recent course of events points

to the conclusion that the day of the big turkey is over, and that there is a steadily-growing demand for birds of more moderate weight.

MARKETING

The most serious questions with which British poultry and egg producers are confronted are those which concern marketing, and it is difficult to see how the industry is to be put upon a satisfactory basis until it is completely organized upon the co-operative plan. So far efforts in this direction have been disappointing, and it may be doubted whether characteristic prejudices against combination will be easily or quickly overcome, but there can be no doubt regarding the desirability of organized co-operation for the adequate handling of such small produce. The isolated producer is so obviously at a disadvantage, and so entirely in the hands of higglers, dealers, or salesmen, that the fact should need no insistence. Yet in many districts the trade is entirely controlled by hucksters, whilst the margin between local prices and those paid in big centres of consumption is usually very wide, although in some favoured districts the conditions make co-operation quite unnecessary.

A very common fault, with individual marketers and co-operative societies alike, is the disregard of trade requirements. Factors that are essential to successful business are unrealized, and better business means combination; but so far those who have combined with a view to better business have for the most part had no suitable training. Co-operation cannot succeed unless conducted on commercially sound principles, and past experience suggests that much remains to be learnt. In any case, whether marketing is or is not a corporate affair, the successful disposal of produce depends mainly upon the efforts and improvements effected by the individual producer.

In some details (e.g. the methods of preparing table poultry) the requirements of different markets vary to some extent, but there are certain broad principles that apply generally. The producer would presumably ascertain the local needs before setting about the killing and marketing of his birds. The seasons of best prices vary somewhat in different localities, whilst the demand is in some cases for birds of one average weight and in others for another; some want chickens tied in the west-country fashion, and others prefer the Sussex manner of pressing and shaping. Such likes and dislikes, preferences and prejudices, should be ascertained and respected by the producer before he enters a

given market; it is not his place to educate the consumer, but to supply his particular needs in accordance with the character of his especial demand. This applies to poultry rather than eggs, because the demand for the latter is generally characterized by the uniformity of standard, viz. brown-shelled and weighing 2 oz.

EGGS

A fatal mistake that is often made by producers and collectors of eggs is that of holding them back on a rising market, and it cannot be too frequently and strongly insisted that reliability for freshness is a primary essential. Producers in this country possess a geographical advantage, if they will only make the most of it, which their foreign competitors cannot overcome. The nearness of the home producer to the home market gives him the opportunity to establish a reputation for the freshness of his produce, although unfortunately his neglect allows the imported eggs more often than not to arrive in better condition, better graded, better packed, and more reliable in every way.

Three days has been set as the age limit of new-laid eggs, and it is futile for producers to imagine that dealers and traders can be deceived in this matter. Carelessness in collection or delay in dispatch to the market reduces value in proportion to the increased age (and consequently reduced freshness) of the eggs so consigned. Evaporation and condensation of the contents are processes that commence when the egg is laid, and the internal indication as shown in the size of the air space at the broad end of the egg is reliable evidence of age. Testing or candling is therefore a commercial necessity, and the grading of eggs according to age is a chief factor in the fixing of values. The process of testing for freshness really concerns the trader or the co-operative official rather than the producer, provided the last-named carefully adheres to a systematic collection of the eggs produced on his farm and a frequent and regular dispatch of the produce.

Size is another important consideration. Very big eggs are needless, and very small ones are useless to the ordinary retailer. Two ounces is the ideal usually suggested as suitable for English requirements. Size varies with breed, but may be very materially modified by careful selection in breeding; the average size of eggs is to some extent a matter of strain. There is, however, in marketing the necessity for grading to standard, a mixture of sizes depreciating the value of a whole consignment. If the labour of grading is imposed upon the buyer he not unreasonably

pays himself by valuing the mixed consignment upon the basis of the small eggs. The marketer of eggs must as far as possible aim at uniformity as regards age, size, and colour. It is unprofitable to mix stale and fresh, large and small, or brown and white; the retailer may mix the colours to suit his own ends, but it pays the producer to consign them separately. Cleanliness is equally important. Soiled eggs are seldom found in the cases of high-grade imported produce. As the washing of soiled eggs, although necessary, is undesirable, it is preferable to prevent soiling as far as may be by keeping the nests clean and collecting the eggs frequently. Soiled eggs are unpleasant objects, and they deteriorate in quality, and therefore in value, by tainting. Whatever the nature of the inferiority, the tendency is to fix the value of the whole case by that of the inferior percentage of its contents.

Good packing is essential to safe transit and remunerative disposal, and successful packing depends largely upon careful grading. Uniformity facilitates close packing, and reduces risks of breakage. This applies more particularly to the packing of eggs in layers and not in sections, and in the same connection it is important to use only cases made of seasoned wood, to protect them from exposure to rain during transit in carts, or when lying in station yards or on platforms, and to pack in dry fresh straw or non-resinous wood wool. For small consignments there are many excellent patent egg boxes, made by most of the appliance makers.

DEAD POULTRY

The details of preparation involved in the production of marketable appearance require to be much more commonly understood than they are at present, a considerable quantity of otherwise first-class produce failing to realize its intrinsic value owing to ignorance of the extrinsic demands of markets. The details that need more careful consideration include killing, plucking, stubbing, shaping, and packing.

Fasting before killing (for a period of about twenty-four hours) is essential to marketable condition, beneficial to the quality of the flesh, and enables the bird to be kept longer, as the result of the emptying of the crop and intestines. Killing methods that involve bleeding are liable to result in the soiling of the carcass, whereas dislocation of the neck prevents this, and is a quick and comparatively painless manner of causing death. The operator should be seated, holding the bird breast downwards across the knees. The legs and tips of flight feathers are held in the left hand, the head is

grasped in the fork of the first and second fingers of the right hand, the head inclined down on the right-hand side, and the comb against the palm of the hand. The neck is gently drawn out in a downward direction, and when fully extended a sharp turn of the wrist and a sudden pulling of the head outwards and upwards at an angle with the neck, causes dislocation—the separation of the vertebral column being distinctly felt. The motion of the hand is instantly arrested to obviate any tearing of the skin, and if the carcass is held head downwards during plucking the blood drains into the cavity between the divided joints of the vertebræ and leaves the flesh white.

Plucking is more easily accomplished immediately after the death of the fowl, and stubbing (the removal of the short stubs or pin-feathers) follows plucking. Singeing may or may not be required in the preparation that is undertaken by the producer—which, of course, falls short of that further work of trussing and dressing that more properly belongs to the poulterer.

According to the Sussex method the legs are then loosely tied together at the hocks, the toes turned backwards and broken, and the birds placed in a press, while warm, to remain until cold and shaped. The press is a shelf with a back set at right angles, and the position of the bird is breast downwards, stern hard pressed against the back board, head hanging down over the front edge, and a narrow weighted board resting along the row of birds on the back above the wings. The Devonshire method of tying is more elaborate. The hocks are tied to within about half an inch of one another, drawing the legs down to the stern, the string being fastened round the "parson's nose". A string is then tied to each of the middle toes, the shanks pressed on to the thighs, and the two ends of string carried one behind each wing and fastened tightly over the back. This throws the breast meat forward under a tightened skin, and is an advantage when birds are not fully fattened; but the best produce is associated with the square compact appearance that results from shaping in a press in the Sussex manner. Turkeys are tied according to local custom, but many salesmen prefer to do the tying themselves; and the wings only of ducks and geese should be turned back, and the carcasses weighted on a shelf until cold.

As in the case of eggs, grading has a direct influence upon market returns. It is always profitable to pack birds of any description in separate packages according to their difference in size. Salesmen and retailers appreciate the fact of evenness in each consignment, and the sender who can be relied upon in such details

is assured of better average prices than those who neglect them. Dead chickens travel best, and maintain a good condition, when packed in Sussex pads, lined with clean straw or bracken. The pad consists of a light but strong frame and staves, for which willow is used, and a loosely-fitting lining of thin deal—the lining boards serving to preserve the shape of the contents, but being sufficiently spaced to allow a free circulation of air. The most convenient sizes hold 12, 18, or 24 birds. Although it is by no means always done, clean butter-paper may be used next the birds, it prevents the straw marking or sticking. Turkeys, ducks, and geese are preferably dispatched in crates or hampers.

CHAPTER VIII

DISEASES OF POULTRY¹

BY HAROLD LEENEY, M.R.C.V.S.

INTRODUCTION

Until comparatively recent years this important branch of study has been neglected, and the poultry books, attempting a summary in a few paragraphs, have been written as a rule by practical poultry keepers without any pathological knowledge. Rivolta in Italy led the way to a scientific investigation of poultry diseases, and has been followed by Eckardt and MacFadyean, Sjöbring and Theobald Smith, Moore, Curtice, and others in America and on the Continent of Europe, as the growth and importance of the poultry industry has been realized by Governments and agricultural authorities.

In the great treatise published under the editorship of Mr. Wallis Hoare, F.R.C.V.S. (*A System of Veterinary Medicine*, 1913), appears the most thorough and exhaustive chapter on coccidiosis of birds, by Mr. Henry Gray, M.R.C.V.S., whose knowledge of avian pathology is probably unequalled at the time of writing. We may hope before long that an intimate knowledge of the causal organisms of bird diseases will lead to the discovery of remedies more potent than any of the rous cures and nostras at present sold with the prime object of making a profit out of the misfortunes of the poultry keeper. It may be said at the outset that nearly all the diseases of birds are of microbial origin, and that the ascertainment of this knowledge confirms the practical experience of all careful observers, and deepens the conviction that the chief evil we have to combat may be expressed in the one word "overcrowding". Our grand-sires recognized land that was "stenched" by poultry, "sick" to horses, and needing a change from sheep or cattle as the case might be, and it has been left for the present generation to discover the reason, or find the explanation. Let us hope we shall do more, and apply the correct treatment. Hitherto the expert has cried:

¹ An index to the diseases dealt with in this chapter appears on p. 269.

Kill! kill! kill! following the policy of the Board of Agriculture and Fisheries in trying to stamp out disease; but the poultry adviser or bird doctor has not the Board of Agriculture's power to draw a cordon around an infected area before proceeding to destroy all diseased or in-contact subjects within the doomed circle. Such an attempt would have to include a high-domed roof of 1-in. wire netting to exclude wild birds, and this would not keep out the causal organisms which come upon and within the prized setting of eggs, or the crates and boxes in which products are packed, or the many other media of contagion to which reference will be made in our notes on the subject. Fault-finding with the Board of Agriculture is an easy task, but we may as easily do injustice to its able veterinary staff, with Sir Stewart Stockman at its head. Too much work and not enough money are the real reasons why more investigation has not been undertaken by the staff of the Board. Moreover, there has not been the public outcry for funds which would give the necessary driving force. The poultry industry is a large one, but it does not concern "the man in the street".

Disinfection

This subject is given the first place, because the prosperity of the poultry yard chiefly depends upon our ability to prevent or destroy those infectious disease germs which are the cause of nearly all the losses sustained by the breeder and rearer of domestic fowl. If the reader is in any doubt about this, let him consult any of the elaborate treatises on diseases published by Continental authorities, and by the various Bureaux of Agriculture so liberally supported by the United States of America. Again, if he will not believe these, let him ask any really well-informed man who has made a life study of poultry in this country.

If the average hen-wife were convinced of the infectious character of poultry diseases, and the absolute necessity of greater cleanliness and more-frequent change of sites, we should have an immediate and a very substantial reduction in the percentage of losses.

How Infection is conveyed.—By the air. By contact. By ingestion. The germs of infectious roup and of tuberculosis can be conveyed by the air. Malignant growths, such as cutaneous psorospermiosis, by contact. The liver disease, tuberculosis, and others by ingestion, or the taking into the alimentary canal of germs adhering to food. These are but a few examples of infectious diseases whose methods of entry are established beyond dispute.

If this is granted it follows that our methods of disinfection must be of more than one kind. We must be prepared to fight germs in the atmosphere of the fowl-house, upon the structure (including all appliances), and in the fowl itself. The beginner should understand that many disease germs have a vitality which is not impaired for a long time although no suitable host or victim harbours them. Thus the dry evacuations of a tuberculous bird may be virulent on the floors of the hen-house, when the dust is stirred up by a bird taking a dust bath there for want of such accommodation elsewhere, and the specific bacillus may thus be inhaled and set up tuberculosis in the lungs. It is not enough, then, to keep the floor dry, or to spread spent lime, or litter the floor with moss litter to absorb moist droppings. Cleaning them up daily is the only satisfactory method of disposal.

Disinfection of Houses and Appliances.—If these can be made nearly air-tight by closing all apertures and placing wet sacks or matting over the crannies or ventilators, disinfection by gaseous methods is the best. Sulphurous acid gas is cheap and effectual, but injurious to metal fittings, which should be vaselined or greased for protection. Chlorine gas is even more penetrating and prejudicial to metals. Supposing a fowl-house to be cleared and ready for disinfection by gas, we may proceed to place an old frying-pan or saucepan, paraffin can, or other valueless article, half-filling it with flowers of sulphur, and mixing it to a wet or paste condition with methylated spirit before setting it alight, and closing the door before inhaling the fumes oneself. The house should be visited from time to time to see that the fumes are not escaping. When the sulphur is burnt out or the supply of atmospheric air will no longer enable it to burn, it may be assumed that nothing is left alive, but the house should not be opened until the sublimed sulphur has settled and the air cleared.

Chlorine gas is developed in the cheapest way by pouring 2 oz. of oil of vitriol on $\frac{1}{2}$ lb. of chloride of lime (bleaching powder), a sufficient quantity being given off for a large fowl-house. Chlorine is heavy, and for this reason the saucer should be placed high up in the building. The greatest effect is obtained if the woodwork of the house is first sprayed with water, for which the gas has a great avidity. For fittings such as nest-boxes and perches that are not removable, a wash can be made of 10 oz. of chlorinated lime shaken up in a stone gallon bottle of water night and morning for two or three days previous to using. As this liquid is very destructive to brushes, one should buy those of common fibre, and wash out again to make serve a second time.

There are many good disinfectants on the market, but their value in the poultry department depends chiefly on the manner in which they are applied. None of the proprietary articles can, however, be sold at a price to compete with those we have just described. Most poultry keepers have great faith in lime-washing, but its value is over-estimated because of the neat and clean appearance it gives. If freshly-slaked lime is used it has certainly some germicidal power, and it fills up cracks and makes life inconvenient for lice and other skin parasites, but can scarcely be regarded as a killer. Nor is it greatly fortified by the addition of carbolic acid, because the acid is largely neutralized by the alkalinity of the lime.

Disinfection of Eggs, Incubators, and Brooders.—If we commence the season with some high-priced sittings from an infected farm, and introduce, for instance, the germs of blackhead upon the eggs, we place them in the most favourable position for multiplication and ready to attack the chicks before ever they have dried off in the nursery. "Newly-purchased eggs for sitting should be washed with methylated spirit."

Incubators, as we have said, may be germ as well as egg hatchers, and it is therefore important to ensure a fair start by disinfection of the machine between the hatchings. The metal tray can be scalded in a bath of boiling water. The felts can be soaked in a 5-per-cent lysol solution, and the woodwork sponged over with the chlorinated water. The tin-dressed or galvanized iron is very easy of treatment, and no harbourer of germs in the sense that wood and felt are.

The brooder, or foster-mother, is more often convicted of infection and of disaster than any other poultry appliance, and should receive very special attention, using aerial disinfection even at the risk of some depreciation of metal work. If the hover is lifted out before setting free the sulphurous acid or chlorine, and the glass sides are closed, there is not very much that will be damaged beyond repair by half an hour's labour with a paraffin rag. The hover with its curtains should be placed in a bath and soaked with a 5-per-cent lysol solution, unless the owner is able to replace the wings or curtains with new material.

It is no great undertaking in modern machines, in which they are merely fixed with brass-headed tacks, and is worth while doing as being the most likely of any part of the apparatus to have soiled parts from chickens with bowel discharges. The complete closing in of a brooder may be effected with wet horse rugs or blankets while undergoing the gaseous disinfection.

Disinfection of the Soil.—This perhaps presents us with the

greatest difficulty of all, although the earth itself is a disinfectant, if we can give it sufficient time. But we cannot wait.

On the appearance of an infectious disease we have probably a variety of birds of all sizes and ages, and any but the most unfortunate would prefer to take the risk of diminution by disease rather than that of immediate ruin by clearing out at a great loss.

What, then, can be done. Isolation of all affected and suspected should be the first procedure. Disinfection of their houses and appliances in one or more of the ways already described, and turning over of the soil where practicable. The latter may be done by the "backyarder", or those who run a few fowls in garden ground, but those who have permanent grass and orchards cannot do so, and must needs resort to some superficial dressing, while the stock is taken as far as possible from tainted ground. Of these paraffin is one of the most effectual, and does no lasting damage to the roots, used in a water can with a fine rose upon the much-soiled ground around the home, and upon the roads and paths where droppings are usually found. Salt and soot and lime are also advised. If the proportion of salt used is large it will temporarily destroy the grass, and cause it to come coarse and dark next time; but we have to choose among evils, and this will be the lesser one, as the probability is that the tuberculous or coccidial fowls causing the mischief have been fed on the same few perches of ground every day, and that the food has been in this way infected on a very limited area. The farther from the home the less likely will infection be caused by the droppings of the already diseased birds.

DISEASE OF THE BREATHING ORGANS

The peculiar construction of the respiratory apparatus of birds is accounted for by biologists by attributing their descent (or ascent) from reptiles. The lungs are not free in the chest cavity like those of quadrupeds, but attached to the ribs and spaces between, and communicating with a series of air sacs or bags which extend far backwards into the trunk, and even into the bones. Although the lungs are comparatively small and inelastic, the communication with the air sacs renders them very powerful, and accommodated with a large reserve of air. If we bear in mind these anatomical peculiarities, we shall better understand how the bodies of birds become infested with such things as mould fungi (*aspergillosis*), which may have been inspired and not ingested or taken directly into the region in which it is found and best multiplies. There is no lid (*epiglottis*) to the larynx, and this accounts for the ease

with which catarrhal fluids escape when a rousy fowl is held up by the heels. We take advantage of this when treating pulmonary troubles. The excess of moisture in birds must needs pass off by means of the breathing organs, as they have no sweat glands in the skin and do not urinate in the ordinary sense of the word. The structure of birds favours the elimination of carbonic acid, the maintenance of a high temperature (106.5° in fowls), and prolonged muscular exertion (as in the homing pigeon).

Catarrh or Common Cold

Fowls are liable to the catarrhal condition of the membranes which we call a cold in ourselves or in quadrupeds, and from similar causes—draughty houses, dust inhaled, sudden changes of temperature, &c. It should be said here that bad air in close houses, and draughts, more often cause catarrh than exposure to the worst of weather outdoors, and that fowls roosting in trees all the year round are the least affected; but this is only one side of the medal, and is not mentioned here by way of advocacy but in explanation. It is important to distinguish between common colds and the infectious variety.

Symptoms.—Dullness, mopiness, and difficulty in breathing, owing to thickening of the membranes before the cold declares itself by a watery discharge from the nostrils. The eyes generally sympathize, and may be disposed to glue together, or one will. Later, as in quadrupeds, the mucous discharge is thicker and more tenacious, and the nostrils are liable to get stopped by the sticky material.

Under healthy conditions a common cold soon passes off, and does not spread in the flock, although two or three at the draughty end of a bad house may have shown the same symptoms.

Treatment.—Drain the birds by holding them up by the legs, and sponge the nostrils and eyes with a 10-per-cent boracic lotion in water.

Good feeding, clean fresh water, and a crystal or two of iron sulphate dissolved in it, is all that is necessary in simple catarrh or common cold; but it has to be borne in mind that the relaxing of the membranes prepares a seed-bed for roup, and for this reason colds should never be neglected.

Roup or Infectious Catarrh

The Scandinavian origin of this word, *roup* or *roop*, simply means hoarseness. Much confusion exists as to the nature of the malady.

Even the expert bacteriologists have not settled among themselves what the causal organism is, or whether that which causes wet roup, without a diphtheritic membrane, is the same as that in which the cheesy deposit blocks the mouth, interferes with the nostrils, and threatens suffocation.

Symptoms.—We may certainly define it as a contagious disease, with a high temperature and catarrhal membranes; the latter extending to those of the eyes, nostrils, palate, and larynx. Further, we may distinguish between wet roup, in which the discharge is fluid, and diphtheritic roup, with the more or less hardened cheesy masses above referred to. Whether the wet is a mild form of the diphtheritic, or a separate disease, is not decided. In practice we meet with a mild, a more severe, and a very severe form of the disease, and distinguish the first from common cold or catarrh by its rapid as well as persistent spread to other birds.

The mild form is hardly distinguishable from catarrh, and this prevents that early segregation which only the expert poultry man at present practises whenever anything—no matter what—ails a fowl. The disease runs its course in about a week, sometimes less. In the severer form the fowl seems oppressed, sleepy, or semi-comatose, is pen-feathered, and the nostrils blocked with thick mucus, which dries and plugs the orifices in the beak, compels the bird to open the mouth in order to breathe, and leads to a hoarse wheezing or croaking noise; and a fluid discharge from the mouth, which is facilitated by holding the bird up by the legs. The appetite is lost, and rapid wasting follows.

A third or most severe form of roup combines the symptoms already named, but with a greater discharge of a peculiarly offensive odour, and with swelling of the membranes of the eyes (conjunctivæ), so that the eyes are obscured by the swelling and bulging of the membrane. A like condition affects the membrane on the other side of the orbit, and an accumulation of thick matter, pus-like at first, but presently assuming the consistence of cheese, so presses against the eyeball that it is pushed out of its natural cavity. The plugging of the nostrils and palate with like material makes breathing and the swallowing of food impracticable, and the sufferer gets no sleep, and finally succumbs. In some birds, one eye only is affected, and among fanciers the term "one-eyed

cold" has been misemployed. If one eye remains clear, many fowls will try to feed at intervals, but find it too much trouble to swallow, and finally sit in a humped-up attitude until they die.

Treatment.—The importance of early separation has already been insisted on, and the writer makes no excuse for repeating it, as so few poultry breeders for market realize, until too late, the serious nature of roup, or the serious form it may take, although they have come safely through mild attacks on previous occasions. So insidious is the malady, that it often appears to the flockman to be of spontaneous origin. Purchased birds should be kept apart for a few days by way of precaution, and disinfection practised in respect of all houses and appliances (see DISINFECTION). Those already affected should be taken to a clean, airy house, free from draughts, and have their nostrils cleared by warm fomentations containing 4 per cent of carbolic acid, or a scruple of permanganate of potash, to $\frac{1}{2}$ pt. of warm water. The eyes should be cleared, and the edges of both eyes and nostrils smeared with vaseline to facilitate the passage of matter. At each dressing the birds should be held up by the heels and allowed to run off a lot of the fluid which has accumulated. If it is caught upon a newspaper it can be readily burned. In very bad types of the disease the milder preparations named may give place to a 1-per-cent creolin solution, or a 1-in-1000 solution of perchloride of mercury in water. It is essential that the "boss" eyes should be freed by opening the swelling with a sharp knife or lancet, as it must be remembered that abscesses, wherever they form in birds, become consolidated, assuming the cheese-like state previously alluded to, and not coming to a point and breaking, as in quadrupeds. Many birds which recover without treatment remain blind for want of this simple operation. The cavity often gapes, and has a hard lining and stiff edges, but time works in favour of the patient, and it eventually closes. The cavity should be mopped out at the time with tincture of iodine, taking care, however, not to let the medicament run upon the sensitive eyeball. For internal medication a pill twice a day is recommended, as follows: Strychnine, 1 gr.; quinine, 30 gr.; powdered capsicum, 60 gr.; extract of gentian, enough to make a mass which is divided into sixty (60) pills. A very prostrate bird, of much value, may be kept going by mixing concentrated foods with the pills, a large pill offering no great difficulty to the nurse in administration, or to the bird in swallowing, if pushed well back into the mouth. For less severe cases we may prescribe iron in the drinking water. About 15 gr. to the gallon of water, if no other is allowed. Many poultrymen are great believers in paraffin as

a specific for roup, but their views are not endorsed by scientific observers. No doubt all tonic remedies help the fowls to overcome a weakening disease.

Inflammation of the Lungs

Many young birds die of this complaint from getting chilled in the cold, wet grass, and the disease is more prevalent among late-hatched chicks on account of the heavy dews. Very rapid breathing, which is technically known as "shallow", is the chief sign, together with those symptoms common to any illness, such as drooping wings and shortening of the neck upon the breast, falling of the tail, and opening of the feathers. No treatment is likely to succeed, although a few recover when promptly brought into a warm, dry house and forcibly fed. The great thing to bear in mind is the prevalence of an infectious pneumonia, and it would appear that the accidental or sporadic variety may readily become infectious. Probably the germs are always about, and that any lung trouble predisposes to invasion by them. Many wild birds die of pneumonia as well as caged pets. On any sign of pneumonia the sufferer should be immediately separated from the flock.

Bronchitis

The same causes which induce catarrh or common cold may lead to bronchitis, the chief of them being exposure to draughts and damp in ill-ventilated houses. Bronchitis may be a prominent symptom of roup, of tuberculosis, or of gapeworms, and we have to distinguish between them. (See ROUP, also CATARRH.)

The symptom of cough is the most distinctive of bronchitis. A chacketing sound, unlike the cough of quadrupeds, is recognized by poultry keepers, and often occurs in adults that have moulted badly, cocks that have run with too many hens, and from other debilitating causes. In acute cases the roughened membranes enable one to detect a whistling sound similar to that of animals. Later there is thick mucus, which leads to efforts to cough it up.

Treatment consists in good nursing and suitable foods which can be easily taken without inducing coughing. Sharps and meal mixed with milk make a suitable food for a few days. All damaged fodder must be eschewed, as mildew and dust excite the membranes. Recovery is the rule. A grain of compound ipecacuanha powder in a pill, with $\frac{1}{2}$ gr. of quinine and 1 gr. of salicylate of sodium, is recommended for a nightly dose.

The Gapes, Verminous Bronchitis

The form of bronchitis the breeder has most to fear is that commonly known as the gapes. It is caused by the presence of worms. The trouble is widespread in the British Isles, yet it was not recognized and described until the early years of the last century. It was known in America first, and may have been imported from that country. As it affects game and other wild birds, domesticated fowls may become infected through running over the same land. The worm is known as the *Syngamus trachealis* or *Sclerostoma syngamus*. The male is very small as compared with the female, and lives in permanent attachment to her, and appears more like an appendage than another worm when viewed with the naked eye. They suck the hosts' blood and impoverish them, besides setting up the irritation which causes the prominent symptom of gapes, or thrusting out the head and gasping. Want of sleep causes the death of many chicks when badly infested. Strong birds overcome the trouble, and eventually cough up the parasites, but weakly chicks succumb in considerable numbers in certain seasons, especially when quartered on ground infected the previous year.

Modes of Infection.—By eating the coughed-up worms containing eggs, and by swallowing embryos in food and water. Although great numbers pass a period of their life outside the host, it has been definitely proved that such external existence is not essential to their reproduction.

Symptoms.—These are so well known as to need no further description.

Treatment.—Although our attention must be chiefly directed to prevention, we may by careful treatment of diseased birds restore a majority of them, and should begin by separation of all with the symptom of protruding the head and gaping or coughing, giving them a clean, dry site and generous ration, which can be easily picked up and digested. The affected birds are taken in the hand by one person, while another seizes the tongue and draws it a little forward with a pair of forceps, and introduces a loop of horsehair down the trachea, previously dipped in turpentine. A fine feather, with only a tuft left at the end, is preferred by other operators, or a small packing needle, the eye of which will hold a small quantity of the drug and release a portion of it when brought in contact with the membrane. Some chicks succumb to the irritation of too much turpentine running down into the bronchi; but a majority, as we have said, may be cured. The worms are coughed up, and with

their removal the patient soon improves. His vigour may be increased and resisting power if a minute portion of iron is given with the food or in the drinking water. 1 or 2 gr. of the sulphate in 1 pt. is sufficient. Many poultry rearers are great believers in garlic for the gapes, pounding it up with hard-boiled eggs and boiled bullock's heart. Megnin places confidence in asafoetida, which he prescribes in quantities of 7 gr. daily for pheasant chicks. It is mixed with equal proportions of powdered gentian root, and made into a paste. Camphor and sulphur are ingredients sold as popular remedies. The advice given by Salmon we fully endorse, when he says: "Those engaged in raising birds should depend rather on prevention than cure". The young birds should be removed to uninfected ground, while dead ones should be burned, and the runs and houses and all appliances disinfected (see DISINFECTION).

Congestion or Engorgement of the Lungs

Many birds die, and that quickly, from pulmonary congestion when in hot weather they are moulting and below par, watered indifferently, and fed on too heating food, especially maize and barley meal.

No treatment is available, but when one case occurs the flock should be given salines, as 1 oz. of Epsom salts to every eight or ten birds, and the diet lowered.

Pneumonia

Chilling draughts and continued wet and unfavourable conditions lead to pneumonia. The symptoms are rapid, shallow, and difficult breathing, the subject standing about with open feathers, head drawn in, and drooping wings. Thirst and constipation may be present. Whether suffering from pulmonary congestion or from active pneumonia the prominent symptom is the rapid respiration.

Treatment.—Immediate isolation is advised, as pneumonia is very apt to take on an infectious form, and then the flock is rapidly decimated. Kill and burn and disinfect; any treatment is likely to fail.

Mould Disease or Aspergillosis

Following on wet seasons and badly-harvested food, we meet with a disease in poultry due to the establishment within the birds of *Aspergillus glaucus* and *fumigatus*.

Symptoms.—Until the malady is advanced no special symptoms attract attention, but later the breathing is affected, the birds snore

and wheeze and yawn from time to time, not like the disease known as gapes, but with the object of taking a very deep breath. Catarrh and diarrhœa and emaciation precede death from this disease. Treatment is useless, as birds breathe all over their bodies and into their bones, and inhalation of tar vapour and other substances calculated to destroy the fungi fail to reach them.

Prevention must be tried by avoiding damaged fodder, and not keeping fowls in mouldy places with a northern aspect.

DISEASES OF THE DIGESTIVE SYSTEM

Digestion does not begin in the mouth in the case of birds, as it does with quadrupeds, but in the crop. It is carried a stage further in the proventriculus or bulging gullet, and then in the gizzard, passing out in a fine state of division into the bowel, there to receive the special juices prepared by the liver and other organs and intestinal glands. The fowl is an omnivorous creature, profiting by both vegetable and animal food, but for the greater part subsisting on the former. Domestication has modified the taste as well as diminished the intelligence of fowls, and they are no longer wise in the selection of food, if a choice exists. A restricted amount of exercise and the supply of concentrated food-stuffs, often of an unsuitable kind, naturally result in many disorders of the digestive system. From simple obstructions of the beak to fatal intestinal complications we meet with diseases of the alimentary tract; some of them of a specific character and others accidental.

The Pip

The drying of the membrane of the tongue and formation of a hard crust is known very generally as pip. It interferes with the movements of the tongue, and consequently with the power of swallowing. The causes are said to be catarrh, and probably some microbial organism (protozoa) of comparatively feeble degree of virulence.

The hardened membrane in some cases curls at the edges, and the keeping open of the mouth hardens it still further. Evaporation from the tongue has a tendency to make the mouth offensive, even in the sweetest of babes, when they sleep with it open.

Treatment.—Moisten with equal parts glycerine and water, or with olive oil, and encourage the membrane to slough off, but in no case follow the bad old custom of tearing it off. A lotion consisting of 1 dr. of chlorate of potash in 4 oz. of water is suitable for

frequent application when once the tongue is denuded of its covering. Soft food, with a portion of olive oil and bread and milk, favour the healing process. As the organism supposed to cause it may be infectious, it is advisable to isolate any bird found suffering from this malady.

Thrush, Aphtha

Another mouth disease resembling that in infants and extremely old persons is designated as above. It is a vegetable parasite which forms spores. A little borax and honey will usually put the bird right. Another and much more serious cause of trouble in the throat is known as

Diphtheria

This is not the diphtheria of infants. It is infectious as between birds, and immediate isolation is advised. The mouth shows an exudate, or an accumulation of yellow cheesy matter which interferes with breathing, and puts the fowl off his feed and pulls him down in health very rapidly.

Treatment.—Painting the parts with tincture of iodine and mechanical removal of the deposit will often cure a case, but the danger to the flock will be the primary consideration, and unless a valuable stock bird is in question, most people will deem it wisest to kill and burn the carcass.

Obstruction of the Throat

Bones and splinters occasionally get lodged in the back of the mouth and commencement of the gullet, and may sometimes be got back by careful handling, pressing from below while opening the mouth, and seizing the foreign body with forceps.

Distension of the Crop

The crop is liable to a catarrh of its membrane, and then it fills with fluid, some of which is occasionally ejected, as if the fowl vomited. It may be caused by giving too much mustard or other hot stuff in the morning feed, when over-anxious poultry keepers desire eggs prematurely. Over-distension by masses of indigestible grain, such as Egyptian maize, causes it when the birds have been too long fasting.

Symptoms.—The chief one which attracts attention is distension of the crop, which when examined is found soft and fluctuating under pressure, and giving the impression of fluid and gas mixed.

Pressure causes belching, and the victims are seen to eject fluid very much after the manner of animals vomiting. The odour of the emissions is very offensive, owing to the fermentation which has gone on. Dullness and loss of appetite and general condition result from the disease.

Treatment.—While held up by the legs the crop must be gently pressed in order to empty it. Then 1 or 2 gr. of carbonate of soda and of bismuth in 2 teaspoonfuls of water may be given. When much fermentation has occurred and delay in treatment, salicylic acid may be employed in the proportion of 1 gr. to 1 oz. of water. A fast of twenty to thirty hours is desirable, after which small quantities of soft food, such as bread and milk or sharps, should be given, and a normal diet gradually attained through increasingly hard food. Farinaceous puddings answer well. Recovery may be expected if treatment is undertaken early.

Impaction of the Crop

Hard crop, or paralysis from an accumulation of hard, dry food with which the viscus has failed to deal, is quite a different thing from the catarrh or windy-crop trouble just described. It is caused by eating too much hard and dry indigestible food, and, in some cases of confined birds, through want of water. Depraved appetite leads to collection of sticks and nails and many substances with which the crop is incapable of dealing.

Symptoms.—Loss of appetite and difficulty of swallowing, moping apart when the flock is called to food, hard swelling, which indicates crop bound (see symptoms of CATARRH).

Treatment.—A first attempt should be made to empty it by pouring warm oil down the throat, and manipulating the mass from outside. Some cases can be managed by patience and frequent reversal of the bird and renewal of the oil. If these measures fail, or if a needle or other sharp object prevents, the crop must be cut open in order to remove the obstacle. The wound need be no more than 1 in. in length, and a position high up should be chosen. When the contents have been carefully spooned out, the lining of the crop should be washed with 10 drops of carbolic acid in a wineglass of water. The wound is then to be stitched with fine white silk. If the bird is fasted for nearly two days the union will have taken place, but for several succeeding days only a little sharps or fine oatmeal and milk should be allowed. On the sixth or seventh day the sutures should be cut with fine embroidery scissors and removed by forceps.

Gastritis and Enteritis

A catarrhal condition of any portion of the membrane of the alimentary canal may occur in fowls, and is named according to the region chiefly affected. We have considered some diseases of the crop, and may now pass on to the proventriculus, the gizzard, and the intestine. The same causes which lead to inflammation of the crop membrane are those which induce like troubles in the other portions.

If any portion below the crop is affected, we look for diarrhœa as the expression of disease, nature endeavouring to expel the noxious substance by copious evacuations.

Diarrhœa and Enteritis

The diarrhœa of adults is generally to be traced to some unusual food or bad drinking water, and with its removal the trouble ceases, unless some constitutional disorder like tuberculosis or coccidiosis is at the bottom of it. The scouring of young chickens is of more importance to the rearer. The modern system of dry chick food is very generally endorsed, although some of our most eminent poultrymen do not agree as to its importance. Our own experience is that chicks fed on dry, small seeds and well-broken mixed grains, such as poultry providers generally supply, is much less likely to induce diarrhœa than soft and moist foods. Scouring may, as we have said above, be taken as a protest against the food given. It is a catarrh of the bowel membrane, and it is to the food we must look for a remedy. If due only to dietetic errors, a cure may be expected from a drop of tincture of catechu in the very young chick, or 15 drops to the quart of water. Scouring should, however, call for our strict attention, as it is so likely to prove to be of the infectious kind.

Infectious Enteritis

The loose chick should be immediately isolated. Many a young bird has a little looseness and adhering fæces to the cloaca which causes death quite unnecessarily, when a bit of egg shell or other stuff acts as a nucleus for a ball to form and block the outlet and make the skin sore and inflamed. If the first sign of drooping is observed and the youngster picked up, this congealed mass may be removed by warm water and the application of a little olive oil, and the next day he will have recovered. He may then go back to the brooder or the hen. If the scour con-

tinues he should on no account be allowed to associate with others, but kept under observation and treated in order to ascertain if it is of a virulent and infectious kind. Of this the breeder will judge by the failure of others, although the food scale has been amended and the water is above suspicion. It pays best to kill and burn. Every effort should be made to stay the plague. The birds should be watched, and several times a day the owner's eye should run over the chicks and have all those removed which look the least dull.

Treatment.—Chicks of value may be worth doctoring, but it is not known how long they may continue infectious. A few drops of laudanum or of catechu tincture in the drinking water may have the desired effect if the birds have sufficient stamina to stand up against the disease. Tonics, as sulphate of iron and quinine in very small doses twice daily, also help to pull them up. Careful feeding and good hygienic conditions favour recovery, but it is very doubtful if the risk of infection of others when again let free is worth taking.

Constipation or Obstruction

As with the crop so with the bowels, too much dry, hard, and innutritious food and insufficient water may cause obstruction.

Symptoms.—The way a bird hangs about and the accumulation of masses of dung behind should be sufficient to call attention to its needs. The parts should be softened by dipping in a bowl of warm water, and the objectionable matter cleared away without tearing the soft skin. The vent may then be oiled and a little introduced. A teaspoonful of Epsom salts dissolved in water and mixed with bran for a morning meal is a suitable laxative in such case, or a teaspoonful of castor oil may be given if the case is considered urgent.

Asthenia, or Going Light

This disease is considered under digestive troubles, but is more probably due to the invasion of an organism which attacks the red-blood corpuscles. The subjects of it waste away without any definite illness, until they become so weak as to find it difficult to walk or carry their wings. This bacterial infection of the duodenum is often mistaken by poultry keepers for tuberculosis, and we have seen going light described in poultry papers as tuberculosis. Many subjects of tuberculosis do waste away; but asthenia, after death, shows no such lesions. The tissues are

white and the muscles quite wasted away; an adult fowl may weigh little more than $\frac{1}{2}$ lb. The malady comes and goes. It takes a toll and disappears, nor can we treat it successfully unless early recognized, when iron and quinine in pill form, given daily, appears to arrest it, or perhaps supply just those elements wanting for the rebuilding of damaged but not destroyed corpuscles, and give strength to the patient to fight out the malady.

Psorospermiosis

Several organisms are said to cause enteritis. They belong to the protozoa. A cutaneous form is often seen, resembling warts, on the head and other parts. It is almost incurable unless the excrescences are very early observed and drastically treated, as with formalin and iodine. It is generally deemed the best policy to kill and burn with a view to prevent the spreading of the disease.

Coccidiosis, Blackhead

Of the modern poultry plagues this is the worst. Called "blackhead" in America, and the "turkey liver disease" in Britain, it has spread to fowls as well as the turkey, in which it appeared to originate. It is caused by a coccidium. The chief means of infection is the presence of the organisms in the evacuations of diseased birds getting on the food when it is thrown down to the flock. When taken in this way, the cæcum or blind gut is infected, inflammation of the membrane follows, a mass of cheesy matter forms and blocks the gut more or less. The liver infection is secondary, and shows after death in the form of yellow depressions or bacterial necroses. Many chicks affected die without the liver lesions. The malady seems to kill by shock in the very young. In mature birds a long illness may precede death, and the birds pass yellow dung, denoting much bile during the active period of invasion by the parasite. Wasting follows.

Treatment.—Immediate isolation is important. Feeding from covered troughs at a distance from soiled ground is advised, and burning of carcasses. Disinfection as far as possible (see DIS-INFECTION). Many claims have been made for different drugs acting as cures, and among them the simple one of mixing 15 gr. of catechu in each gallon of water, or the like amount of sulphate of iron; no other drinking water being allowed. For birds of value it is worth trying, but in outbreaks among young ones the stamping-out policy is probably the cheaper.

Worms

Both round and flat or tape worms are found in poultry, and quite a formidable list of such as are peculiar to the different species are to be found in Pneumann's *Parasites* and other works on helminthology. The remedies usually employed for quadrupeds are suitable for fowls, but pomegranate root bark is specially recommended for tapeworm, about 1 gr. for a dose, or a teaspoonful for fifty birds. Areca nut suits fowls but not turkeys. The pill form of medication is best for worms, and should be given after a day of fasting. A very good worm pill for an adult fowl may be made of 2 or 3 drops of extract of male fern, 5 drops of turpentine, and 10 gr. of areca nut. Larger doses are often given.

Parasites of the Skin

These are very numerous and often troublesome, but with cleanliness and disinfection of the houses and clearance of nest-boxes can be kept under. All the external parasites of poultry may be destroyed by a mixture of flowers of sulphur and lime, or of pyrethrum dusted into the feathers by a flour-dredger while the bird is held up by the heels. This should be done with broodies before sitting them, as the chicks are much less likely to become infested.

DISEASES OF THE BREEDING ORGANS

Most of the troubles connected with the egg apparatus are due to excessive production from selected laying strains, and to artificial stimulation by mustard and various advertised tonics, sold with the view to egg formation and early and persistent laying. Rupture and apoplexy are quite common. The causes should be avoided, and the 200-egg bird accepted for a maximum layer.

Egg Bound

When a hen goes frequently to the nest and without result she should be caught up and the parts manipulated. The trouble can generally be diagnosed, and the introduction of a little warm oil enables one to press from the sides and get away the obstructing egg. A broken egg is more difficult, because the contractions meet with no resistance. With a finger and a pair of forceps some part of the skin of the egg can be seized and the whole drawn out; after which the lubrication of the passage and a lowered

diet generally results in restoration. Neglect results in fatal gangrene.

DISEASES OF THE FEET AND LEGS

Leg weakness in the young may be only due to injuries or imperfect nutrition, but in older birds is generally of rheumatic or gouty type. Treatment should be commenced with an aperient of 1 dr. of salts in water, and followed by 5-gr. doses of salicylate of sodium daily.

Injuries to the feet and legs should be fomented clean of foreign matter and then receive a thick smear of boracic ointment. Nothing poisonous should be used, as birds are disposed to peck it.

Corns are caused by perches supplied being too narrow. They may be pared away, or the green corn solvents for human use applied, or salicylate collodion used.

Scaly Leg

This is a form of mange. It is best treated by a mixture of 1 part flowers of sulphur and 2 parts soft soap, a thick layer being put on at night and two days later washed off and repeated, but with lard instead of soap. The soap opens the thick masses of scales and enables the drug to penetrate in old-standing cases.

Bumblefoot

Deep bruising is the cause of this deformity, and the formation of matter which fails to break through. The suffering fowl should be caught up and the abscess opened and syringed out with a four-grain-to-the-ounce solution of permanganate of potash lotion. Narrow perches and high ones both cause this trouble, the birds often having to alight with too steep a descent.

Tuberculosis

As this disease affects all the organs of the body and the welfare of the flock more than any other, we have given it a place apart. The actively infectious diseases, such as enteritis and coccidiosis (which see), take the greatest toll among chicks, but tuberculosis accounts for more loss probably than all other diseases of fowls when the nursery period is past. It is a subject so much in the public eye, and a general knowledge of it so

widespread in the present day, that we need only say that it is accepted as due to a specific bacillus or bacterium, the avian variety differing from the bovine and the human, not morphologically, but in its behaviour under cultural methods.

Its distribution is said to occur in a great variety of ways, as the moist bacillus may be taken into the digestive tract with food, and the dry one in the dust of the fowl-house inspired into the respiratory tract. It may be conveyed on eggs, as well as on the legs, feet, and feathers, and in appliances of every kind—perhaps by persons in attendance. However this may be, we have abundant evidence that the disease spreads in a flock where one or more members are affected, and it is to the means of combating it that we must look.

The symptoms vary according to whether it takes an acute or chronic form. Generally speaking the flock owner gets some intimation when birds are killed for the table. If the liver is spotted or tubercles have begun to form he should be on his guard, and get the point settled by someone who can recognize the specific lesions. If he has sick birds which slowly fade away he should kill one or two and learn the worst, so that he may know how to act.

The advice is generally offered to clear out and begin anew another year on fresh ground and with new stock, but this is not always practicable, or may entail greater loss than milder measures. Feeding away from the soiled ground around the farmyard, and in troughs so covered that fowls cannot get into them, reduces the chief risk of soiling by the excreta of the diseased. By this means, and the disinfecting measures recommended under DISINFECTION, a gradual clearance may be made at a time when nature will do most to purify the soil, namely, late autumns, followed by winter rains and frosts and perhaps snow. This recommendation has often been made, with the result that so few losses have followed that the original instruction to clear out altogether has been disregarded, until a fresh outbreak has succeeded to careless feeding near the back door and upon the tainted ground. Whether or no the avian, the human, and the bovine varieties of tuberculosis are as easily transferable to different species as some suppose, it is both the interest as well as the duty of poultrymen to use every means of eradicating the disease. For further information of a general character respecting tuberculosis in animals, see other sections of this work.

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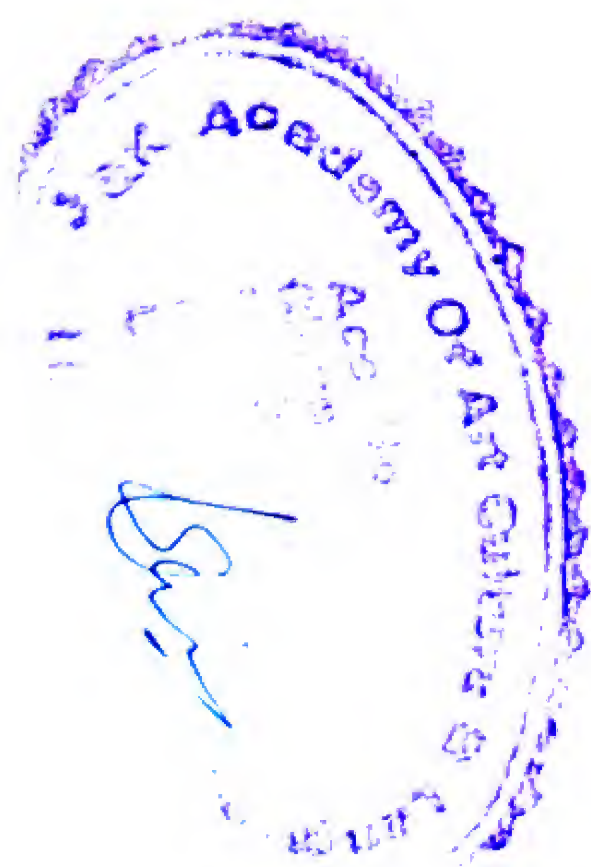
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